U.S. Army Tactical Cloud Technical Exchange Meeting

August 1 – 2, 2018




Network CFT …Collaboration, Fusion & Transparency

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Distributed Computing – Mission Command Technical Exchange Meeting

MG Pete Gallagher
Director, Network CFT

1 AUG 2018






AMERICA'S ARMY
THE STRENGTH OF THE NATION

Network Path Forward

Problem Statement: The current network is too complex, fragile, not sufficiently mobile nor expeditionary, and will not survive against a peer adversary, especially in a contested and congested environment.

Halt
- Programs that do not meet operational requirements

Fix
- Capabilities required to "fight tonight"

Pivot
- New Modernization Approach
- Leverages Innovation of Commercial Industry
- Proven Joint / SOF Solutions

Adapt & Buy

Cross Functional Team

Current Network:
- Complex and Fragile
- Lacks Air & Ground Integration / Interoperability
- Excessive Electromagnetic Signature
- Lacks Anti-Jamming
- Spectrum Shortages / Dynamic Spectrum Allocation
- Cybersecurity
- Not Expeditionary or Mobile

- ✓ Warfighting
- ✓ Enterprise
- Intelligence
- Business

Find, Try, Adapt & Buy

FUTURE STATE 1
- Converged Network
- Cloud
- Unified Transport
- Unified NETOPS
- Single network enabling multi-domain forces
- Cyber / EW
- Network extension
- Protected SATCOM
- COE Full Operational Capability
- Manned and unmanned interoperability
- Agile and expeditionary command posts

FUTURE STATE 2
- Internet of 'battle things'
- Mesh network
- Intuitive and seamlessly integrated (aided by AI and advanced interfaces)
- Persistent cross domain operations
- Balanced access vs. protection

Future Network:
- Mobile
- Expeditionary
- Resilient
- Survivable and Protected
- Intuitive
- Standards-Based
- Interoperable
- Sustainable
- Competitive

Lines of Effort

Unified Network	Common Operating Environment	Joint/Coalition Interoperability	Command Post Mobility & Survivability
Assured network transport in a contested environment against a peer adversary. Dominate Cyber Electromagnetic Activities (CEMA).	Distributed mission command and rapid decision making (Observe, Orient, Decide, Act).	Joint interoperability/coalition accessibility with all Unified Action Partners.	Mobile/ survivable CPs in a dynamic, lethal combat environment.

Collaboration – Fusion – Transparency

Develop capabilities faster and in a less costly manner to enable our Soldiers to fight and win!

Cloud Efforts

- Multi-cloud environment
- Reducing data and hardware complexities
- Interoperability, Defensive Cyber Operations (DCO), and Network Operations (NETOPs)
- Management and integration of advanced capabilities

DoD

ENABLES:

Effectiveness

- Faster and more accurate decision making
- Improve situational awareness

Security

- Reduce attack surface

Efficiency

- Improve information sharing and collaboration
- Decrease disparate data processing
- Synchronize data and services between the enterprise and tactical edge
- Better correlation of data

Army Enterprise

Key Features:
Secure, Accessible, Resilient, Survivable, Elastic, Dynamic, On-Demand, AI-Ready, Automated, Self Serve

- Establish approved hybrid hosting environments
- Migrate enterprise systems to commercial hosting
- Use DoD solutions (e.g., milCloud 2.0) for sensitive apps
- Maintain "antique" environment for select apps
- Streamline cloud service acquisition

Army Tactical

Deployable cloud infrastructure to enable distributed Mission Command

- Modernize infrastructure to consolidate data repositories
- Leverage common software and hardware platforms
- Leverage enterprise to enable tactical public key infrastructure, security information and end point security
- Reduce bandwidth burden at lower echelons
- Establish tactical services in the enterprise cloud where applicable
- Move toward common tactical software platforms and services in the command post and at the tactical edge

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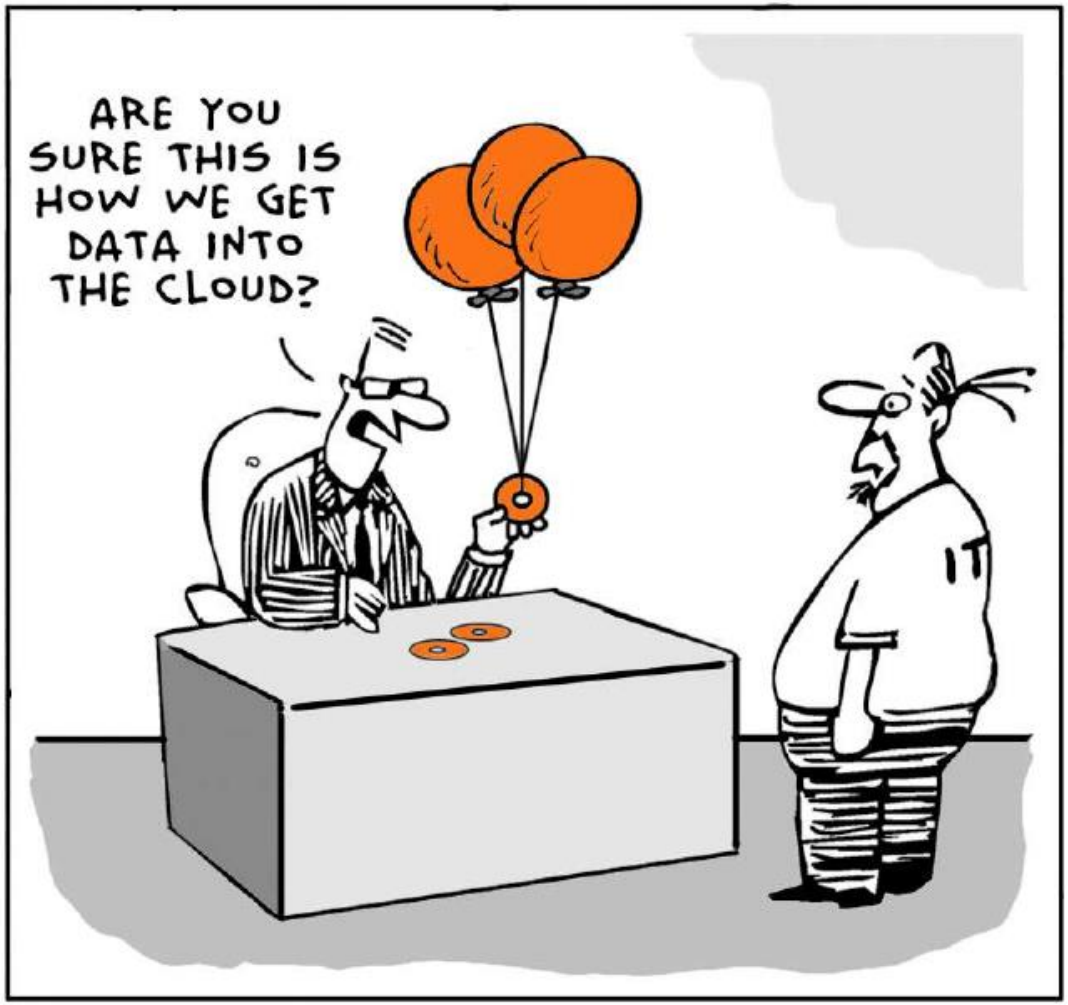
Technical Exchange Outcomes

Explore the art of the possible to meet Army network needs for distributed computing (mission command) solutions



Source: D. Fletcher, CloudTweaks
https://cloudtweaks.com/2011/05/the-lighter-side-of-the-cloud-data-transfer/

- Inform the Army's approach on how to employ cloud services for tactical formations
- Educate the Army on capability ideas to address contested and congested environments, low bandwidth, spectrum denied, and many other factors that preclude traditional cloud solutions
- Assist industry partners and interested government organizations to identify and align their efforts with Army tactical network modernization priorities
- Enhance our Government–industry communication to enable industry to respond quicker to critical emerging requirements with innovative technology solutions and partnerships

Distributed Mission Command: Army Operational & Network Overview

1 Aug 18

Erik Hanson
PEO C3T

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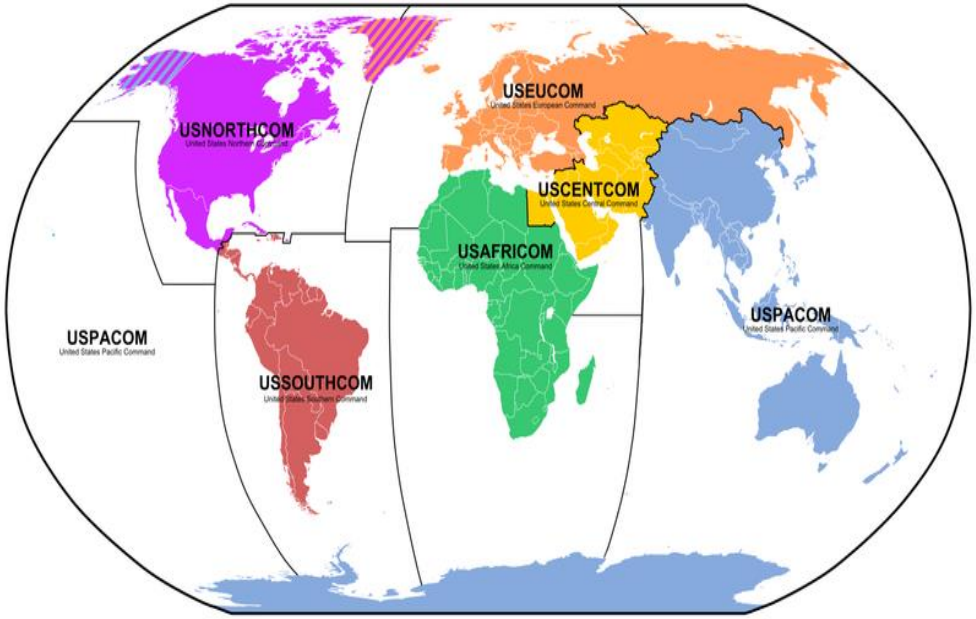
Agenda

- Introduction
- Combatant Commands
- Echelons of the Army
- Connecting Soldiers
- The Network & Challenges

Combatant Commands

Geographical

- **United States Africa Command**
- **United States Central Command**
- **United States European Command**
- **United States Northern Command**
- **United States Pacific Command**
- **United States Southern Command**



Functional

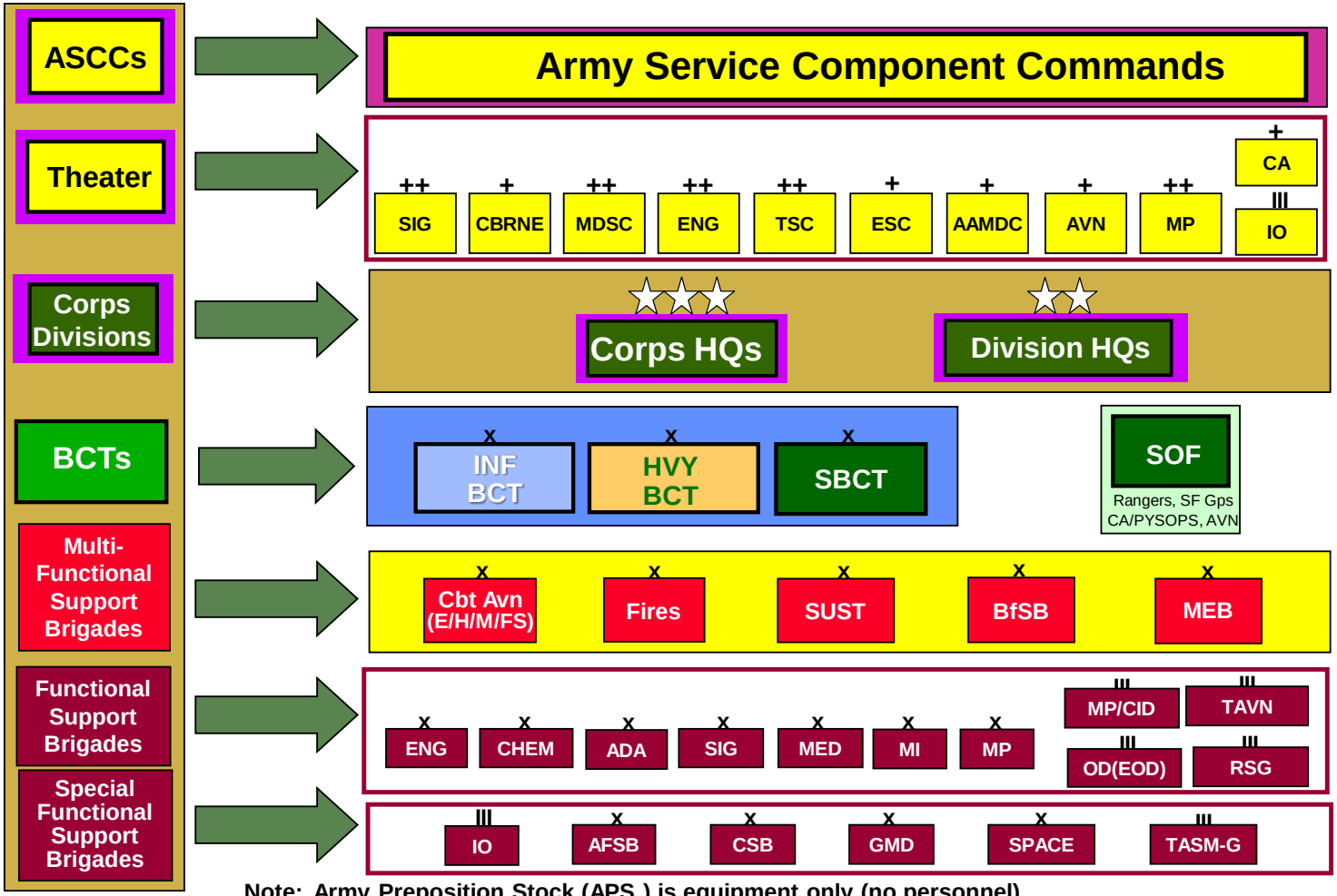
- **United States Special Operations Command**
- **United States Strategic Command**
- **United States Transportation Command**

COCOM

- A unified or specified command with a broad continuing mission under a single commander established and so designated by the President, through the SECDEF and with the advice and assistance of the Chairman of the Joint Chiefs of Staff. - *AR 10-87*
- Established to provide effective command and control of U.S. military forces, regardless of branch of service, in peace and war
- Commanded by a Combatant Commander (CCDR), who is a four-star General or Admiral

Operating and Generating Force Structure

Operating & Generating Force Structure (generic)



Note: Army Preposition Stock (APS) is equipment only (no personnel)
Old Guard, 11th ACR & ATEC are Generating Force Structure

Sizes of Army Units

Name	Strength	Composition	Symbol	Commanded By
Corps	30,000 - 80,000	2+ Divisions	XXX	 Lieutenant General
Division	10,000 - 20,000	2-4 Brigades or Regiments	XX	 Major General
Brigade	2000 - 6000	2+ Regiments or 3-6 Battalions	X	 Colonel
Regiment	2000 - 3000	2+ Battalions	III	 Lieutenant Colonel, Colonel
Battalion or Squadron	300 - 1200	2-6 Companies	II	 Lieutenant Colonel
Company	70 - 250	2-6 Platoons	I	 Captain
Platoon	26 - 60	2-4 Squads	• • •	 Lieutenant
Section	10 - 24	2-3 Squads or Parts Thereof	• •	 Staff Sergeant or Sergeant First Class
Squad	8 - 16	2+ Teams	•	 Staff Sergeant
Team	2 - 6	N/A	o	 Specialist, Corporal, or Sergeant

Organizational Designs of the Army

ARMY SMALL UNITS

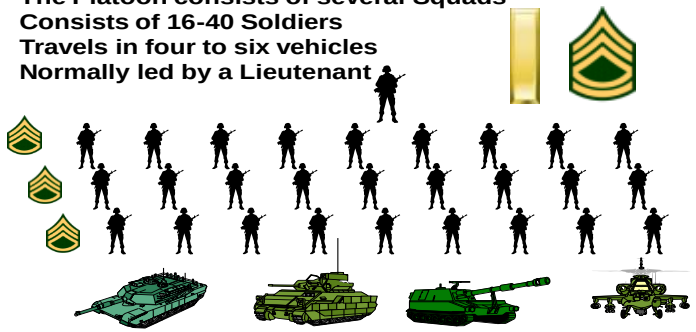
The Squad

- It consists of 4-10 Soldiers Combat crews usually travel in one vehicle
- Normally led by a Staff Sergeant
- Lowest level unit that acts independently
- Patrols are usually performed by Squads

In the Series "Band of Brothers", the patrols are conducted by Squads. In "Blackhawk Down" , most of the fighting occurs at Squad level

The Platoon

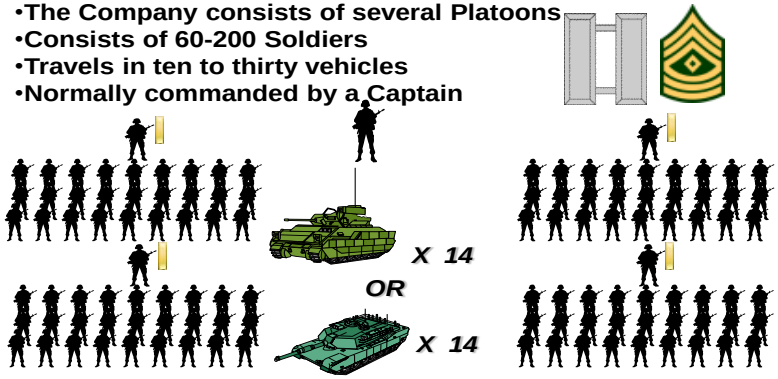
- The Platoon consists of several Squads
- Consists of 16-40 Soldiers
- Travels in four to six vehicles
- Normally led by a Lieutenant



The movie "Platoon" is about a fictionalized infantry platoon in Vietnam

The Company

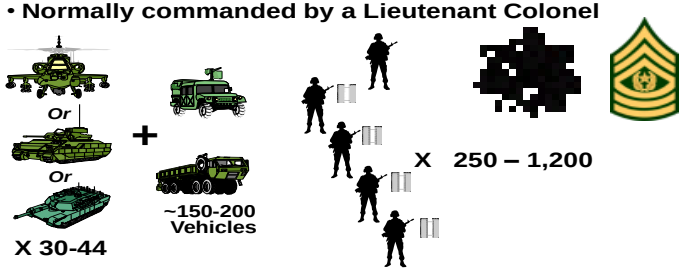
- The Company consists of several Platoons
- Consists of 60-200 Soldiers
- Travels in ten to thirty vehicles
- Normally commanded by a Captain



In "Saving Private Ryan, Tom Hanks leads a Ranger Company ashore on D-Day

The Battalion

- The Battalion consists of several Companies
- It has several hundred vehicles
- Normally commanded by a Lieutenant Colonel



In "We Were Soldiers", Mel Gibson leads an Infantry Battalion
In "Courage Under Fire", Denzel Washington leads a Tank Battalion

Organizational Designs of the Army (Cont.)

ARMY LARGE UNITS

The Brigade Combat Team

The Brigade Combat Team consists of 2 maneuver battalions
A reconnaissance squadron, artillery battalion, and support battalion. It can operate independently for 96 hours
It is normally commanded by a Colonel

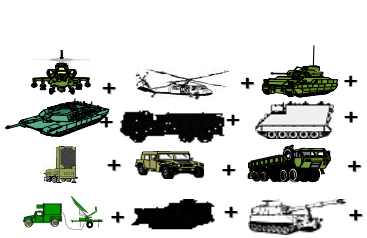
X ~3,200 – 4,300

~1,200 Vehicles

Russell Crowe's Roman Legion in "Gladiator" was about the size of a Brigade.

The Division

The Division consists of the headquarters elements to command and control 1-6 BCTs and their associated support brigades. It is the principal warfighting command and control echelon. The headquarters can operate independently for extend periods. It is normally commanded by a Major General.



X ~ 900 in HQ

X ~ 15,000 soldiers

X ~ 3,700 vehicles

The Third Infantry Division led the attack on Baghdad during Operation Iraqi Freedom

The Corps

The Corps consists of several Divisions. It has extensive logistics capability and long range attack assets
It can conduct independent ground campaigns
It is normally commanded by a Lieutenant General

X ~ 900 in the HQ

X 30,000 – 100,000 in a Corps

~25,000 Vehicles

The Fifth Corps coordinated 3rd Infantry and 101st Airborne operations in Operation Iraqi Freedom

The Army

The Army is the THEATER level Army command echelon. It performs as the overall ground command for an area, and is usually the Army Service Component Command (ASCC) HQs. It operates the theater level combat operations. It is authorized a General, but is often commanded by a Lieutenant General

Example:	
COCOM	ASCC
SOUTHCOM	USARSO
PACOM	USARPAC

X 400-700 in the HQ

X 100,000 – 300,000 in the Army

~75,000 Vehicles

During Operation Iraqi Freedom, Third Army controlled both Fifth Corp and Marine Units for General Tommy Franks.

Mission Command & Decision Making Processes

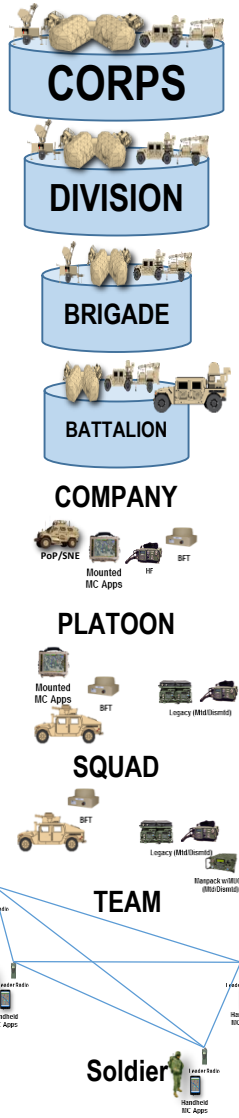
Mission command **is the exercise of authority and direction by the commander using mission orders to enable disciplined initiative within the commander's intent to empower agile and adaptive leaders in the conduct of unified land operations. ADP 6-0**

***Mission Command System*—the arrangement of *personnel, networks, information systems, processes and procedures,* and *facilities* and *equipment* that enable commanders to conduct operations. ADP 6-0**

ANALYTICS & KNOWLEDGE TRANSFER

DATA GENERATION & AGGREGATION

COMBATANT COMMAND
ARMY
REGIONAL HUB NODE

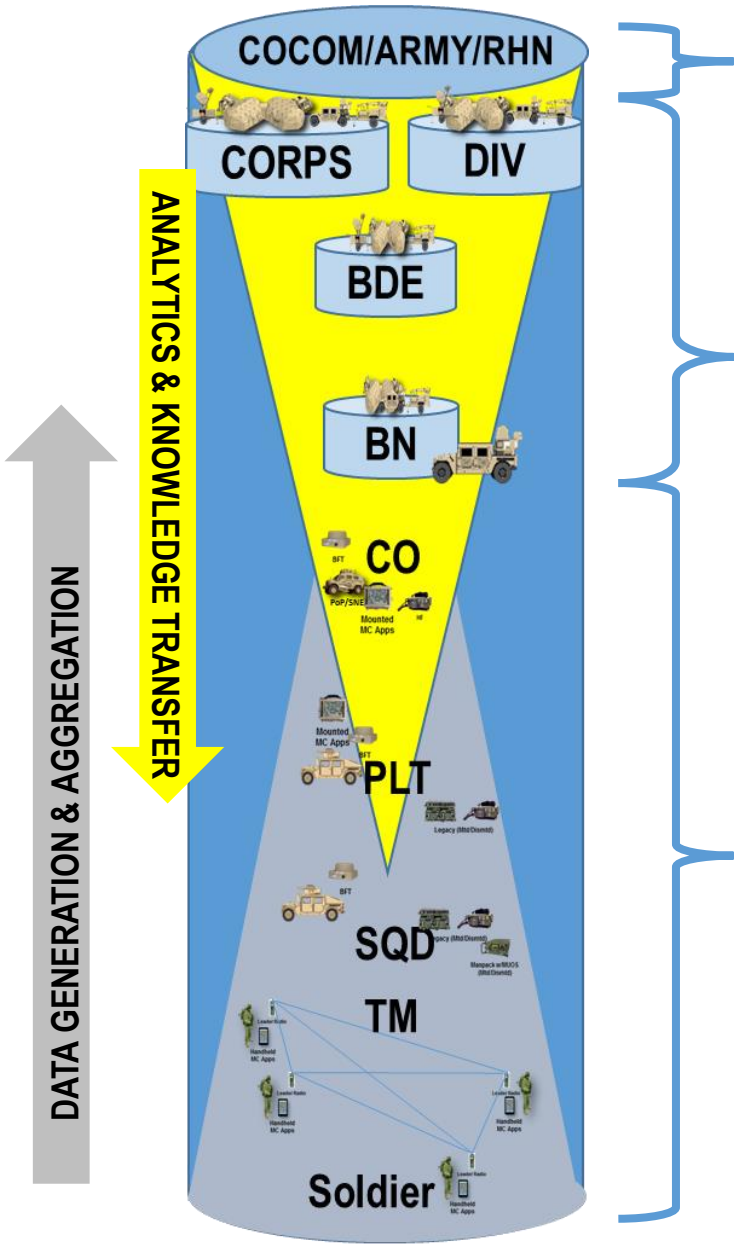


Decision Making Methodology

Military Decision Making Process (MDMP)

Troop Leading Procedures (TLP)

Army Operation Environment: Examples



Combatant Command / Army / Regional Hub Node

- Fixed/Secure Infrastructure
- SWaP Unconstrained
- Greater Analytic Capability
- Large Information Pool

Corps / Division / Brigade / Battalion

- Temporary Infrastructures
- Moderate to Limited Connectivity
- SWaP Constrained (2 man carry max)
- Power/Cooling Fluctuations
- Irregular Shut Down & Restart
- Frequent Location Changes
- Delete – Rebuild Incident Resolution Method

Company / Platoon / Squad / Team

- Dynamic Infrastructure
- SWaP Absolute Limitation (man-packable)
- Battery Power
- Atmospheric Cooling Only (No Fans)
- Constantly Mobile
- Intermittent Connectivity

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Common Operating Environment Problem Set

MC / C2 / Maneuver

CPOF

JBCP TOC KIT

CMD Web

TIGR Core Server

TIGR Client

TIGR Standard Server

Intelligence

DCGS-A MFWS

DCGS-A WS GEOINT & TGS

Fires

AFATDS

AFATDS EMT

JADOCS

Protection

JWARN/JEM ENGINEERS

Sustainment

CSS VSAT

Airspace Mgmt/Def

TAIS

TAIS

TAIS AWS

AMPS

FAAD C2I / C-RAM

AMDWS

ADAM Cell

C-RAM

Network Mgmt

JTNT

Network Management

NETOPS

Server Infrastructure

BCCS

DCGS-A IFS

TMC Gateway

Server Mgmt Console

Server Mgmt Console

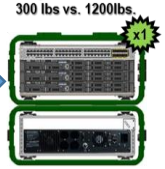
CP Infrastructure

SIPR, NIPR VOIP

Future State

Mounted CE Platform Smart Client

Brigade and above 300 lbs vs. 1200lbs.



Battalion (and Brigade COOP)

TSIv2 and Laptop Server

Command Post CE Web Client

Command Post Networking

Beyond Line of Sight

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Mounted Environment

Dismounted Devices

AMERICA'S ARMY
THE STRENGTH OF THE NATION

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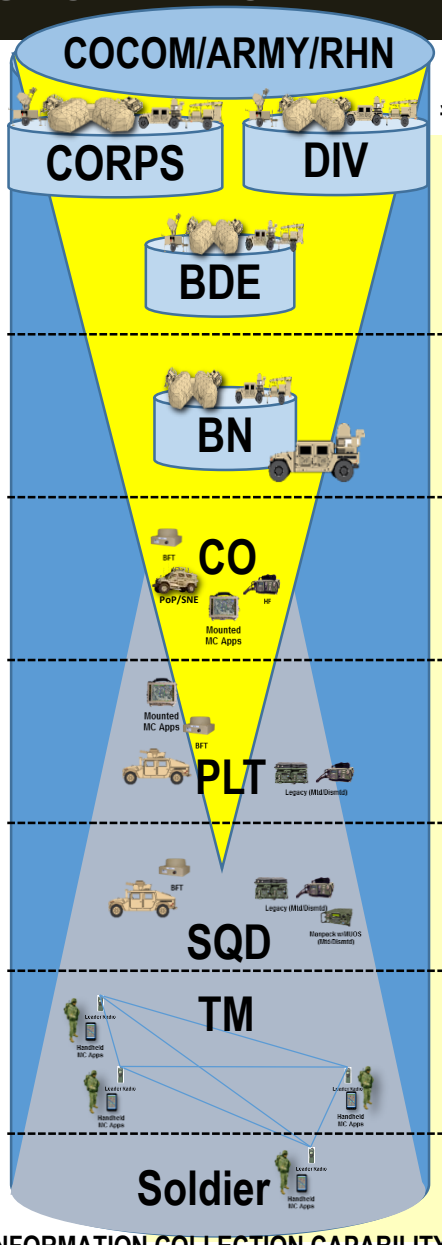
The Network

Current Lowest Common Baseline

ANALYTICS & KNOWLEDGE TRANSFER

DATA GENERATION & AGGREGATION

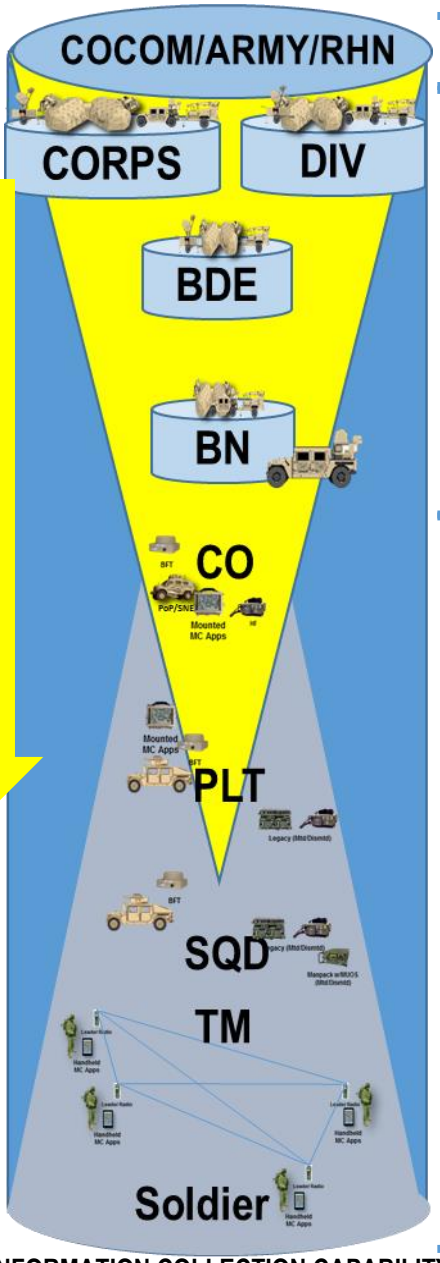


Battle Command Systems / Applications		DATA			VOICE
		TRANSPORT BANDWIDTH			
MCS/CPOF AFATDS BCS3 AMDWS FBCB2/JBC-P TIGR	TAIS DGCS-A BVTC NETOPS Nett Warrior	NCW (OTM) NCW (ATH) Ku / Ka FDMA Ku / Ka TDMA	HNW	MUOS JBC-P w/ BFT2 SRW	UHF SATCOM HF SINCGARS
MCS/CPOF AFATDS BCS3 AMDWS FBCB2/JBC-P TIGR	TAIS DCGS-A BVTC NETOPS Nett Warrior	NCW (OTM) NCW (ATH) Ku / Ka TDMA	HNW	MUOS JBC-P w/ BFT2 SRW	UHF SATCOM HF SINCGARS
MCS/CPOF SIPR/NIPR FBCB2/JBC-P TIGR Client DCGS-A NETOPS Full Motion Video	ISR Data Nett Warrior	NCW (OTM)		MUOS JBC-P w/ BFT2 SRW	UHF SATCOM HF SINCGARS
FBCB2/JBC-P	Nett Warrior			MUOS JBC-P w/ BFT2 SRW	SINCGARS
FBCB2/JBC-P	Nett Warrior			JBC-P w/ BFT2 SRW	SINCGARS
FBCB2/JBC-P	Nett Warrior			JBC-P w/ BFT2 SRW	SINCGARS
Position Location Sensors Information				SRW	SINCGARS

INFORMATION COLLECTION CAPABILITY

MUOS (9.6 - 64 kbps)	SRW (100-300 Kbps)	JBC-P w/ BFT2 (800 bps)	WNW (200 - 1 Mbps)	NCW (OTM) (256 kbps)	NCW (ATH) (10 Mbps)	Ku / Ka FDMA (4 Mbps)
SRW (EW) (80- 60 kbps)	SINCGARS (16 kbps)	UHF SATCOM (76.8 kbps)	HF/VHF (16 Kbps)	NCW (OTM) (128 kbps)	HNW (OTM/ATH) (30 Mbps)	Ku / Ka TDMA (2-4 Mbps)

Distributed Mission Command Challenges



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- Battery Power
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Problem Areas

1. Data Logistics
2. Infrastructure
3. Distributed Tactical Computing Environment
4. Mission Partner Environment

Questions

Mission Command & the Common Operating Environment

Mr. Jeffrey R. Witsken
Mission Command Network Integration
Mission Command Center of Excellence

Network CFT …Collaboration, Fusion & Transparency

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Purpose and Agenda

Purpose:

Define Mission Command, Distributed Mission Command, and introduce the Common Operating Environment

Agenda:

- Mission Command
- Operational View
- MC Network Capabilities
- Common Operating Environment
- Summary

What is Mission Command?

Mission Command Philosophy

Exercise of **authority** and **direction** by the commander using mission orders to enable disciplined initiative within the commander's intent to empower agile and adaptive leaders

- Build cohesive teams through mutual trust
- Exercise disciplined initiative
- Provide a clear commander's intent
- Use mission orders
- Create shared understanding
- Accept prudent risk

*The principles of mission command balance the **art of command** with the **science of control**.*

Mission Command Warfighting Function

The related **tasks** and **systems** enable a commander to balance the art of command and the science of control in the conduct of Joint Combined Arms Operations

Mission Command System:

- **Personnel**
- **Facilities and Equipment**
- **Processes and Procedures**
- **Information Systems**
- **Networks**

Knowledge-based decision making in difficult circumstances…

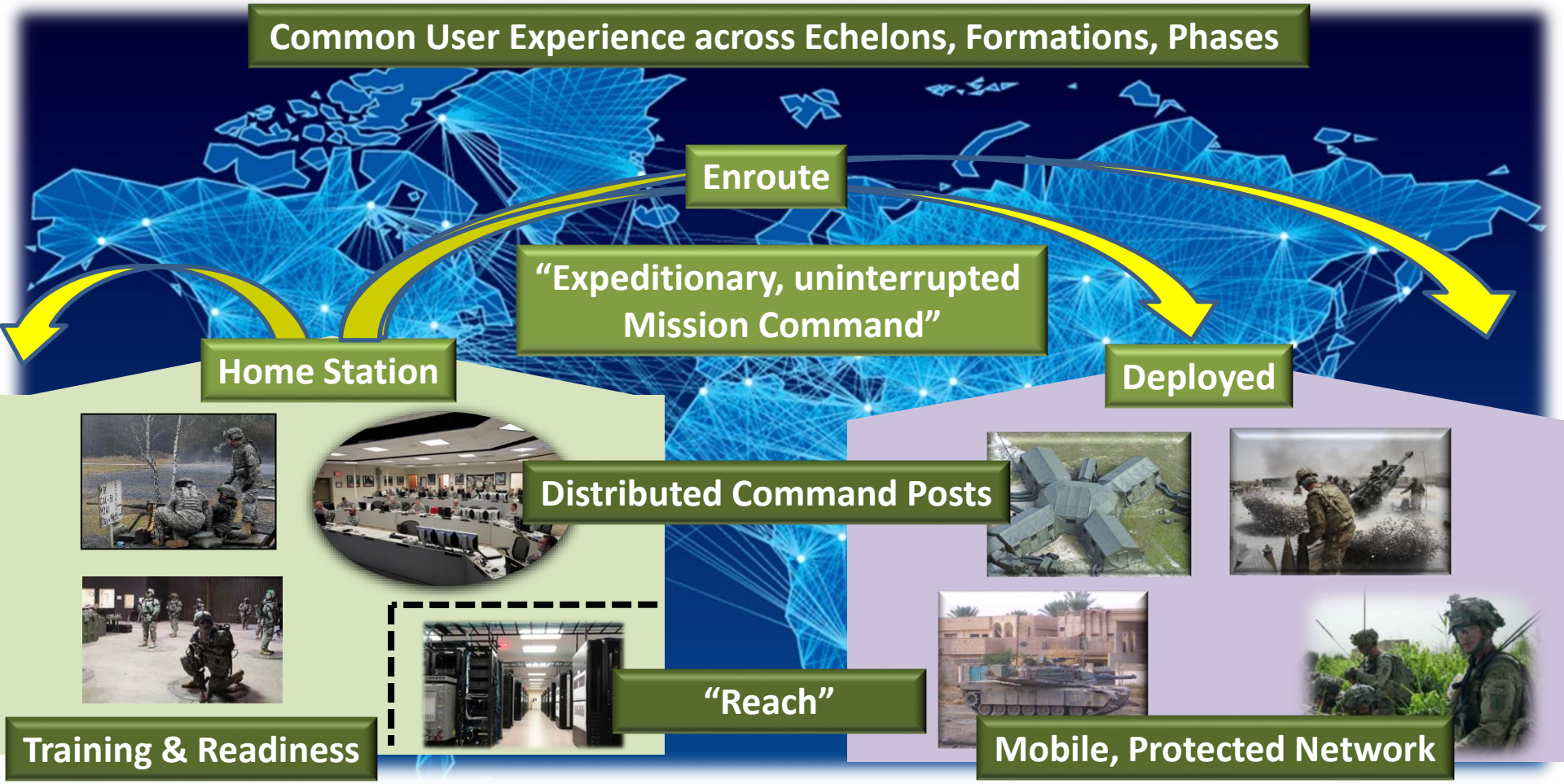
Supported by distributed computing, data storage & retrieval, enhanced collaboration, and advanced decision tools

Operational View

"Expeditionary and Mobile, voice, data, and video on the move"

"Enables the Warfighter to observe, orient, decide, and act faster than the enemy"

"Enables leaders to lead and fight their formations from anywhere they choose"



AMERICA'S ARMY

Mission Command Network Capabilities

Global Enterprise

Joint Information Environment

1 Converged Mission Command Network

Brigade HQs (Deployed)

2 Synthetic Training Environment

Joint Interoperability

5 Network augmentation & extension

Coalition Accessibility

4 Common Operating Environment (Unified suite of mission command applications)

Battalion HQs (Deployed)

3 Integrated Command Posts

Company (Deployed)

Capabilities work in a disrupted, intermittent, limited (DIL) environment

Devices & radios seek multiple communication pathways

KCA-16-480

Common Operating Environment

FROM:
- **Single Purpose HW/SW**


Comms


GPS/Location


Weather


Pictures


Sharing Data


Schedule


Maps

TO:
- **A Rich Set of Warfighter Apps (e.g., Logistics, Intel)**
- **Common Software Baseline**
- **Converged onto a Common Suite of HW Devices**

Dismounted

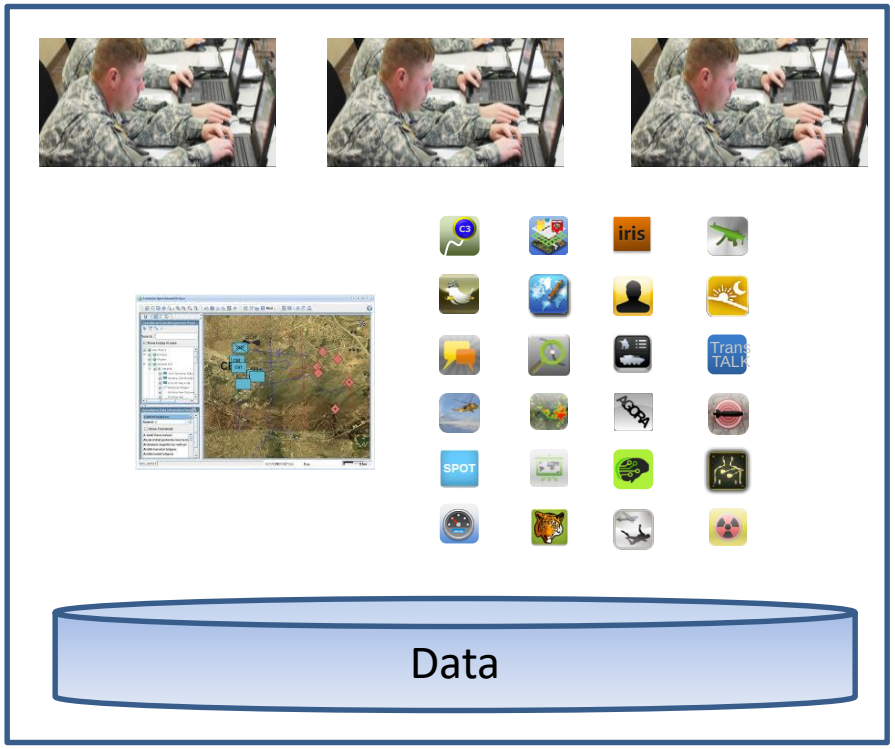
Mounted

Command Post

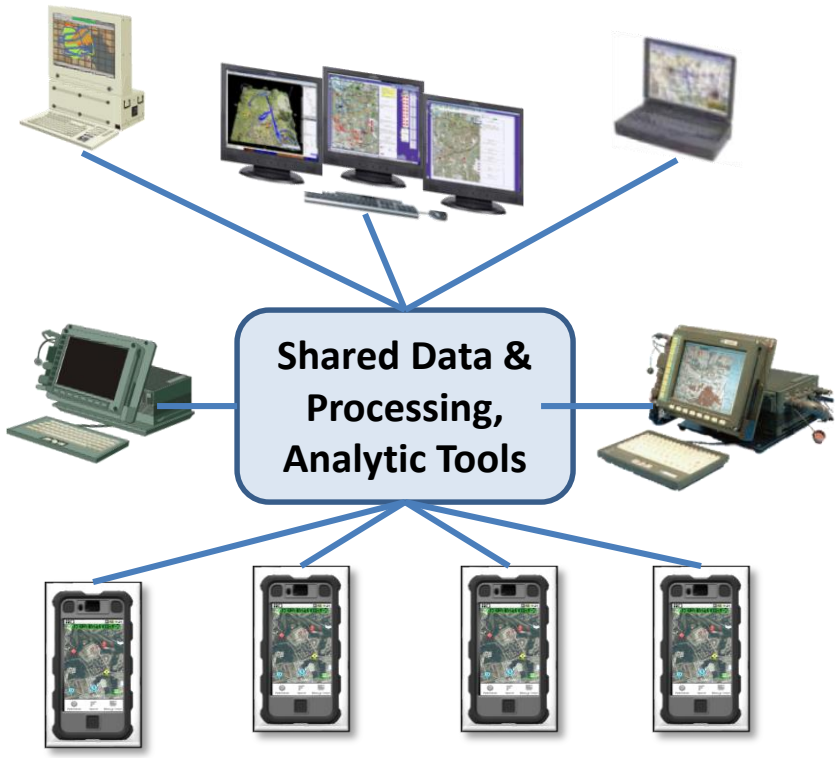
The Common Operating Environment sets the stage for enhanced collaboration, situational understanding, and use of advanced decision technologies

Applications and Data

Web-based Applications: Access across Echelons & Functions



Cloud: Shared Storage & Processing



- User access to relevant applications and data determined by the user's identity
- Application functionality resident across computing environments
- Applications use unified data and other cross-cutting capabilities
- User training redefined to applications necessary "to get the job done"

Summary

Mission Command Philosophy

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As the Army moves to the Common Operating Environment…

How can we best enable Distributed Mission Command?

Questions?

CSA's Principles, Characteristics and Requirements

Principles (Why)	Warfighting Requirements	Characteristics of the Network	Technical Network Requirements
Mission: The Army must fight and win wars against adversaries… 1st Principles: The Army network must enable: 1. Conduct of War: Execution of expeditionary, world-wide, Unified Land Operations (ULO) to shape, prevent, and win as a part of Unified Action in all domains and all environments (Note 1/2/3/4) 2. Preparation for War: Execution of Title 10 responsibilities to man, train, and equip the force, and to build and sustain readiness.	❑ Able to fight, shoot, move, communicate, protect, and sustain ❑ Reliably communicate anywhere, anytime, in all domains, in all environments, against any foe	❑ Simple and Intuitive, single mission command suite (Single COP), installed, operated and maintained by Soldiers ❑ Available, Reliable and Resilient with the ability to operate in all operational environments against any enemy ❑ Expeditionary and Mobile, voice, data, and video on the move ❑ Standards-based, protected, and dynamic network that is upgradeable over time ❑ Enables the Warfighter to Observe, orient, decide, and act faster than the enemy in the conduct of ULO (Note 4) ❑ Enables use of the network as a weapon system ❑ Enables leaders to lead and fight their formations from anywhere they choose	❑ Must be capable of adequate secure communications, provides voice, data, video in all environments ❑ Capable of providing situational awareness down to Platoon level ❑ Device works anywhere in the world; installed, operated and maintained by Soldiers ❑ Standardized: Runs on a COE, common graphics, applications, and integrated data ❑ Ensures continuous Joint interoperability enabling agile and adaptable operational flexibility ❖ i.e., Enables Rapid Task Organization and employment of joint capabilities ❑ Mitigates electronic signature ❑ Accessible to allies and coalition partners

Note 1: Unified Actions Partners – Consisting of Joint, Interagency, Intergovernmental, and Multi-National (JIIM) partners
Note 2: Domains – Land, maritime, air, space, cyber
Note 3: Environments – Permissive, non- permissive, contested, denied

Note 4: ULO – Simultaneous offense, defense, and stability or defense support of civil authorities tasks to seize, retain, and exploit the initiative and consolidate gains to prevent conflict, shape the operational environment and win our nations wars as part of unified action

Mission Command-Command Post Computing Environment (CPCE) SDK Update

Command Post Computing Environment (CPCE)

1 August 2018

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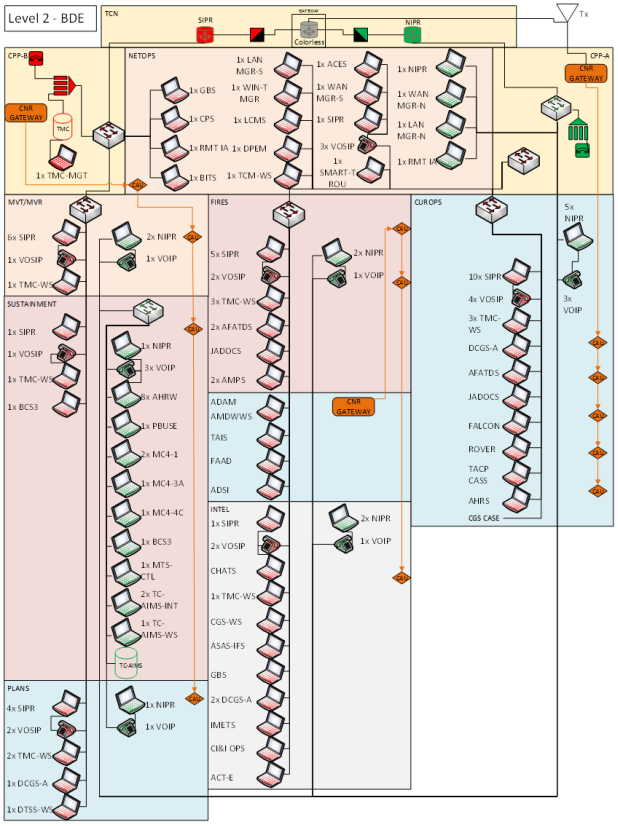
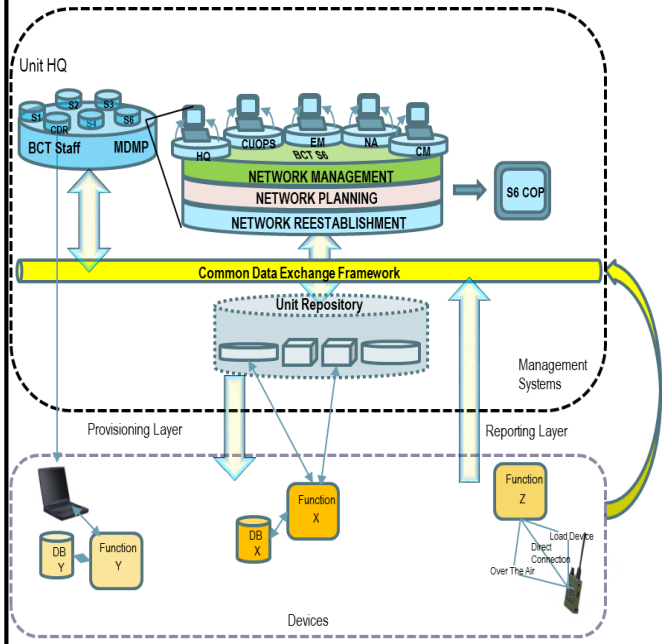
Towards a Cloud Environment

Current 2018



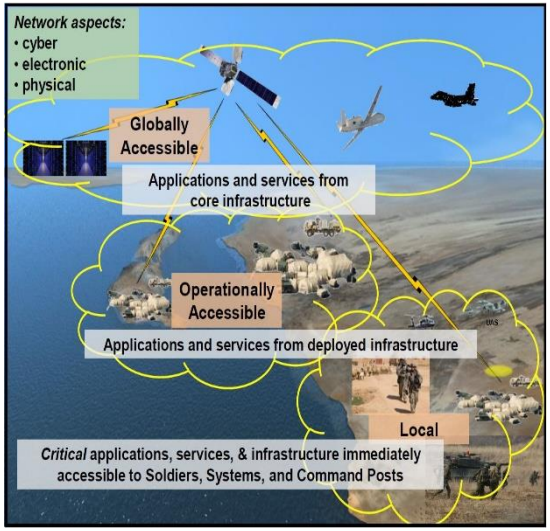
- Local Hosting of data, HW and SW increases complexities and no easy way to share data
- Client-Server Based Architecture
- Information only exists on local device
- Publish & Subscribe data dissemination

Near 2019-2021



- Leverages DoD & Army Cloud efforts for an operationally deployable cloud at the edge
- Reduce amount of data and sources, HW complexities and maximize discovery for Services, Joint & Coalition interoperability
- Synchronizations with Enterprise services such as identity management services, sharing of critical cyber data, end point security services
- Synchronization of data and services between the deployable and fixed network to include home station mission command

Future 2021 & Beyond



- Software-defined networking
- On-demand bandwidth
- Aggregated cloud access gateways
- Secure, integrated, standards-based environment that ensures uninterrupted global access
- Enables collaboration and decisive action throughout all operational phases across all environments

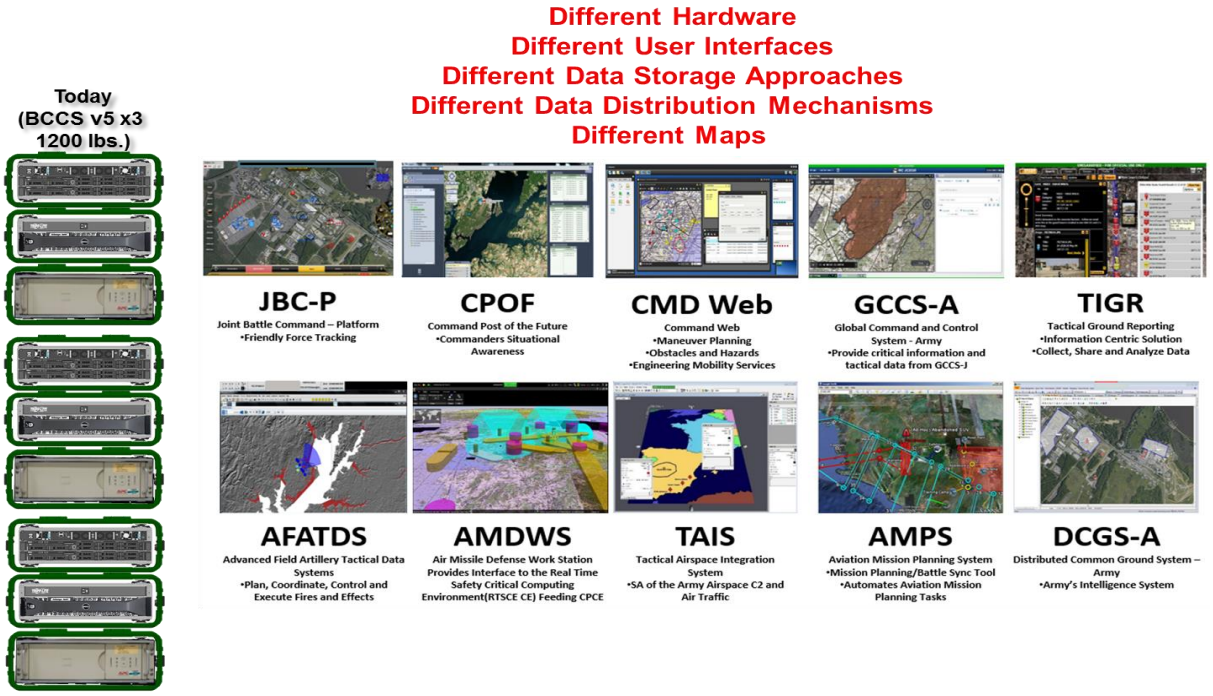
Modular Architecture

Operational Challenge

- Command Posts (CP) lack the agility to **shoot, move, and communicate** against a near-peer threat
- Commanders are faced with data overload and lack a integrated Common Operating Picture (COP) to see **self, the enemy, and their battlespace**

*"Today the Army employs more than **15 different Mission Command systems, each supporting its own warfighting function (maneuver, fires, intel, etc.).** These stovepiped systems generate roadblocks to sharing information across functions and challenge the commander's ability to efficiently and effectively process the operational picture. Each system also has a custom interface that complicates training and operator proficiency. Separate hardware for each system unnecessarily increases equipment footprint and complicates upgrades, repair, and replacement."*

Network Study

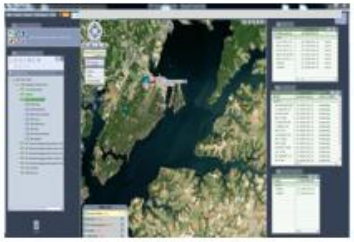


Current Situation

Different User Interfaces
Different Data Storage Approaches
Different Data Distribution Mechanisms
Different Maps

JBC-P

Joint Battle Command – Platform
•Friendly Force Tracking



CPOF

Command Post of the Future
•Commanders Situational Awareness

CMD Web

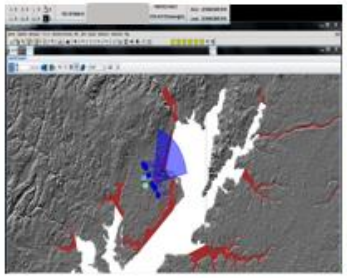
Command Web
•Maneuver Planning
•Obstacles and Hazards
•Engineering Mobility Services

GCCS-A

Global Command and Control System - Army
•Provide critical information and tactical data from GCCS-J

TIGR

Tactical Ground Reporting
•Information Centric Solution
•Collect, Share and Analyze Data



AFATDS

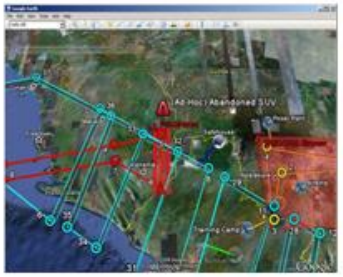
Advanced Field Artillery Tactical Data Systems
•Plan, Coordinate, Control and Execute Fires and Effects

AMDWS

Air Missile Defense Work Station Provides Interface to the Real Time Safety Critical Computing Environment(RTSCE CE) Feeding CPCE

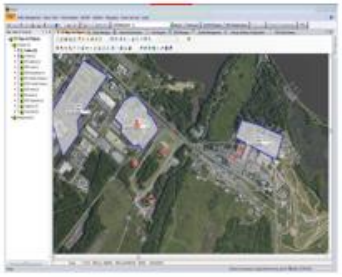
TAIS

Tactical Airspace Integration System
•SA of the Army Airspace C2 and Air Traffic



AMPS

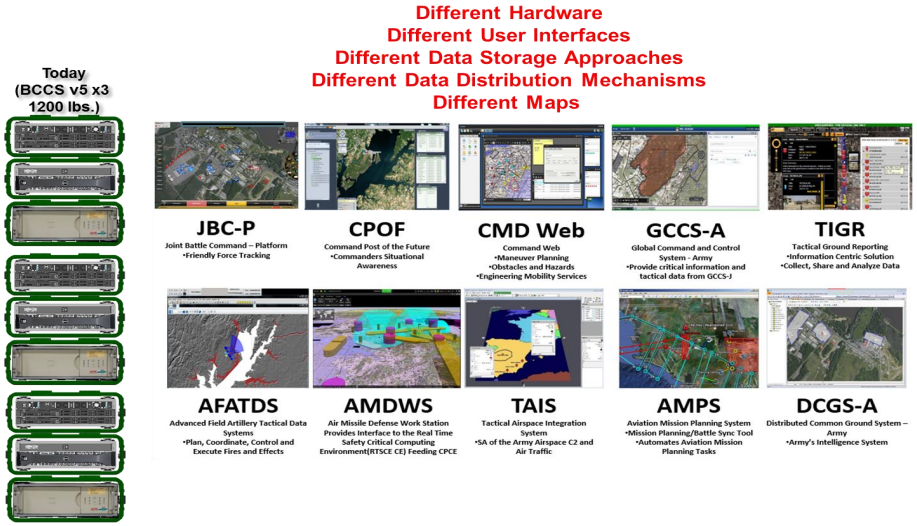
Aviation Mission Planning System
•Mission Planning/Battle Sync Tool
•Automates Aviation Mission Planning Tasks



DCGS-A

Distributed Common Ground System – Army
•Army's Intelligence System

Developmental Challenge

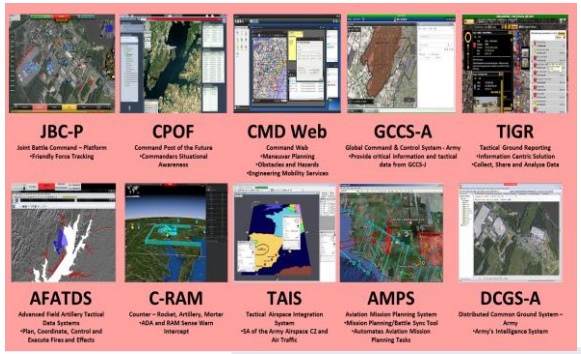


- Convergence is key—hardware, software, training, user workload, CDR decision space
- Each Program has *their* vendors—*their* vendors have *their* interest
- Transfer of risks between programs
- System must be simple and intuitive—no training for basic operators (No job description or specified training for COP operators)
- Solutions must be portable across hardware and software environments
- Within Mounted and Command Post CEs PM Mission CMD will serve as the homeowners assoc.
- Operate within our SDK and APIs—we will bend them to be accommodating as possible

Roadmap

Today

Software



Hardware

FY19-25

- Fielding V3.0 across the Army
- Iterative Software Approach to converge warfighting functions (PORs) onto one ecosystem
- Hardware Approach (TSIv2) – SWaP and physical footprint reduction through HW consolidation, HW modernization, and Multi-enclave solution
- Unit-level DevOps – user feedback to improve products

Micro Servers & Tactical Cloud

Mission Command Information System/CPCE

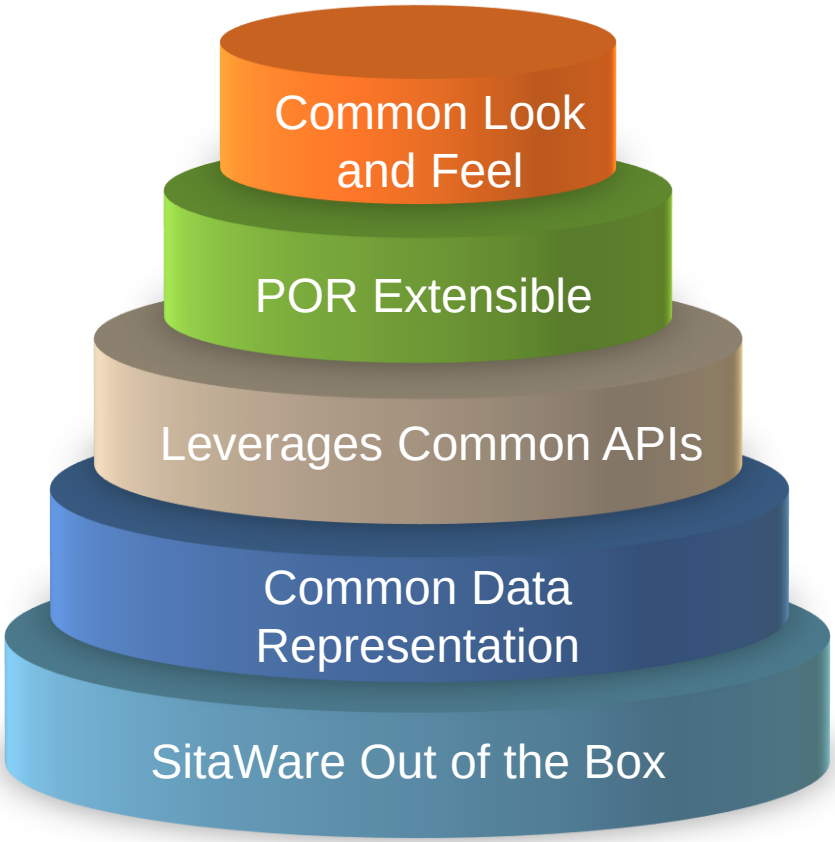
Mounted Mission Command

- Enterprise Management – automation, patch management, IdAM
- Expeditionary ops capabilities realized through small, dense form factor HW scalable across operational phases
- Cybersecurity hardening – Palo Alto Firewall, Lieberman privileged access management

Technical Drivers for FY19 Solution

POR Extensible
Extensible for other Programs of Record to develop into the environment

Common Data Representation
Provides a common data representation across CPCE/MCE v3 CPCE and MMC Clients

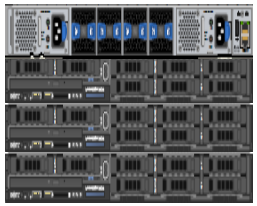


Common Look and Feel
Achieves common look and feel across CPCE/MCE v3 CPCE and MMC Clients

Leverages Common APIs
Provides common APIs for accessing infrastructure services and applications

SitaWare Out-of-the-box:
Uses the Product's tactical communication capabilities to support movement of data across a range of upper and lower tactical internet environments

Command Post Computing Environment



TSI Large

- Hyper-converged physical server stack
- Employs hardware virtualization
- Hosts CPCE Server SW
- Hosts additional WfF servers/ services

Server Mgmt Console

- Non-Ruggedized
- Manages TSI
- Operates on management VLAN

TSI Small (Laptop Server)

- Ruggedized
- Employs hardware virtualization
- Hosts CPCE Server SW
- De facto server if TSI Lg unavailable
- SW packages can be HW-agnostic
- Quicker startup, simpler management

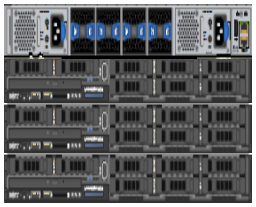
Army Approved Computer w/Chrome

- Unit Provided

CPCE Server

- Command Post Computing Environment Server (CPCE Server)
  - Used to refer to the combination of Persistence, Geospatial, and Web VM Software
  - Deployed on the TSI Small / Large and accessed by laptops with a browser
  - HW resource allocation scaled to support either TSIv2 Large or TSIv2 Small (Laptop)

Physical HW Platform



TSI Large

TSI Small

Logical SW Services

Hosted WfF App Svcs

CPCE Server

Retained Legacy MC Svcs

(Robust) Enterprise Services

HW/Virt Infrastructure

CPCE Server

Retained Legacy MC Svcs

(Basic) Enterprise Services

HW/Virt Infrastructure

Physical SW Packages

Web VM

Persistence VM

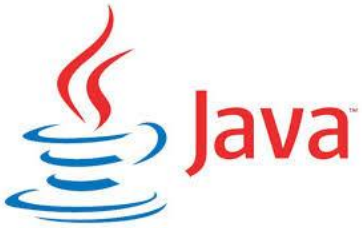
Geospatial VM

- **Persistence VM**
  - Data storage and retrieval components
- **Geospatial VM**
  - Network mapping resources to support Geospatial Requirements
- **Web VM**
  - MC Application/ Framework/ Infrastructure (SitaWare) and Interoperability Services

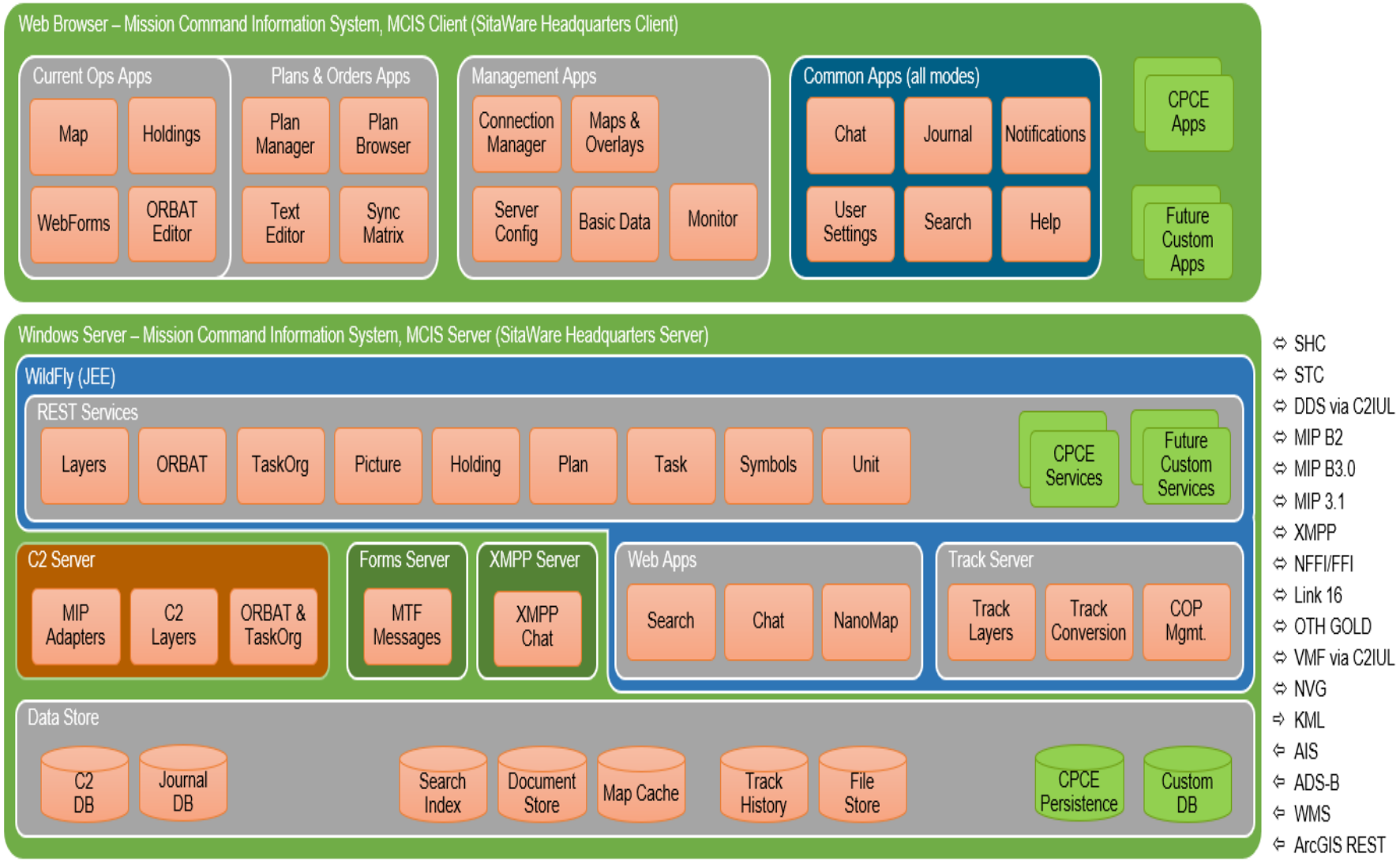
Key Technologies

Technologies include:

- SitaWare Headquarters – primary C4I system
- WildFly – web application server
- Atmosphere Framework – implements communication bus
- Java EE – web application backend
- AngularJS – web application frontend
- Karaf – OSGi container
- Windows Server – operating system
- SQL Server – relational database management system
- Active Directory – directory and identity services
- Exchange – mail and calendaring



CPCE Extensible Framework



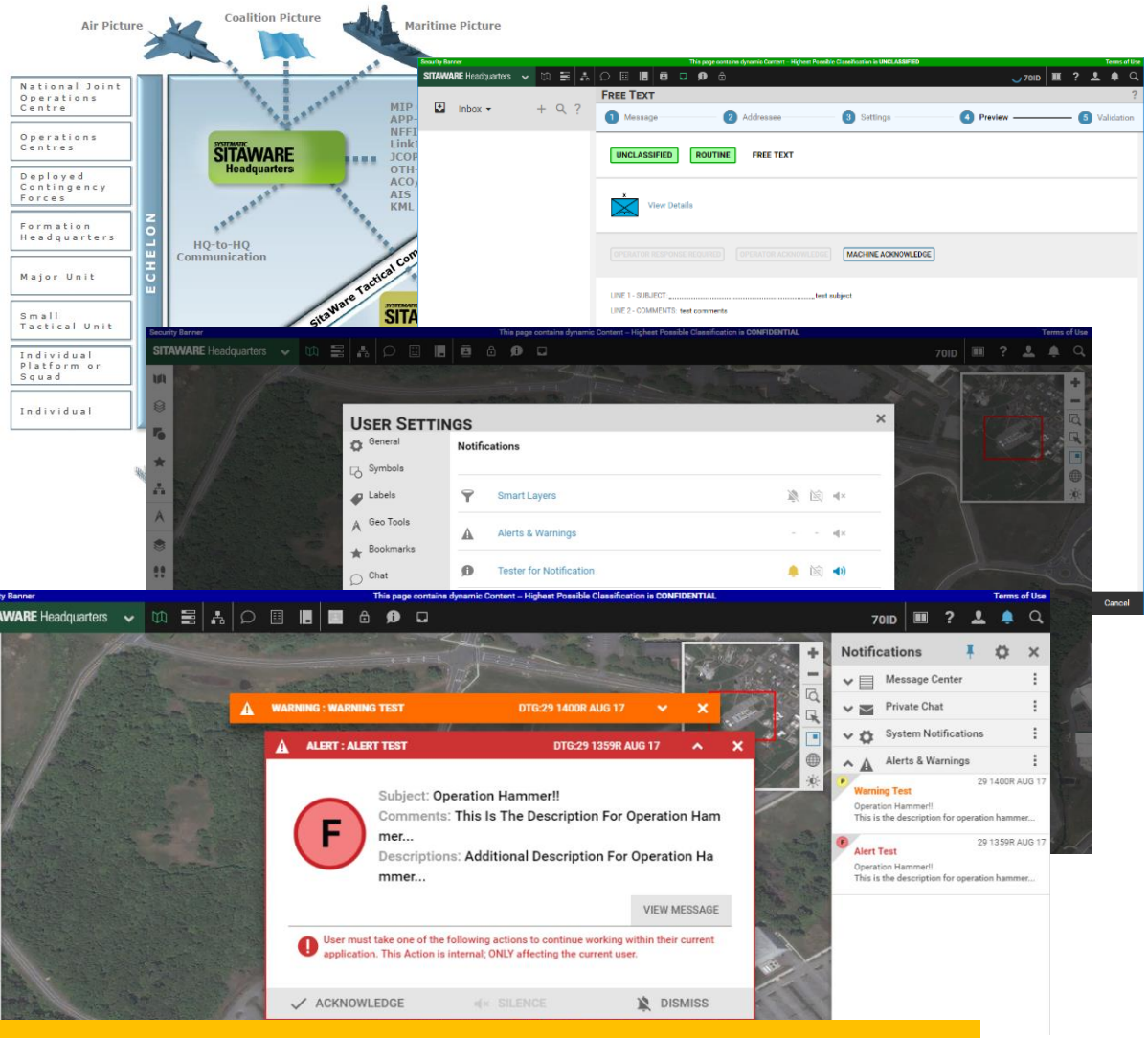
Infrastructure and Core Utilities

Common Infrastructure

- SitaWare HQ
- SitaWare STC/SHC
- Persistence
- Data Service
- C2I Ultra Lite
- Geospatial/SSGF
- Common Sync Framework

Core Utilities

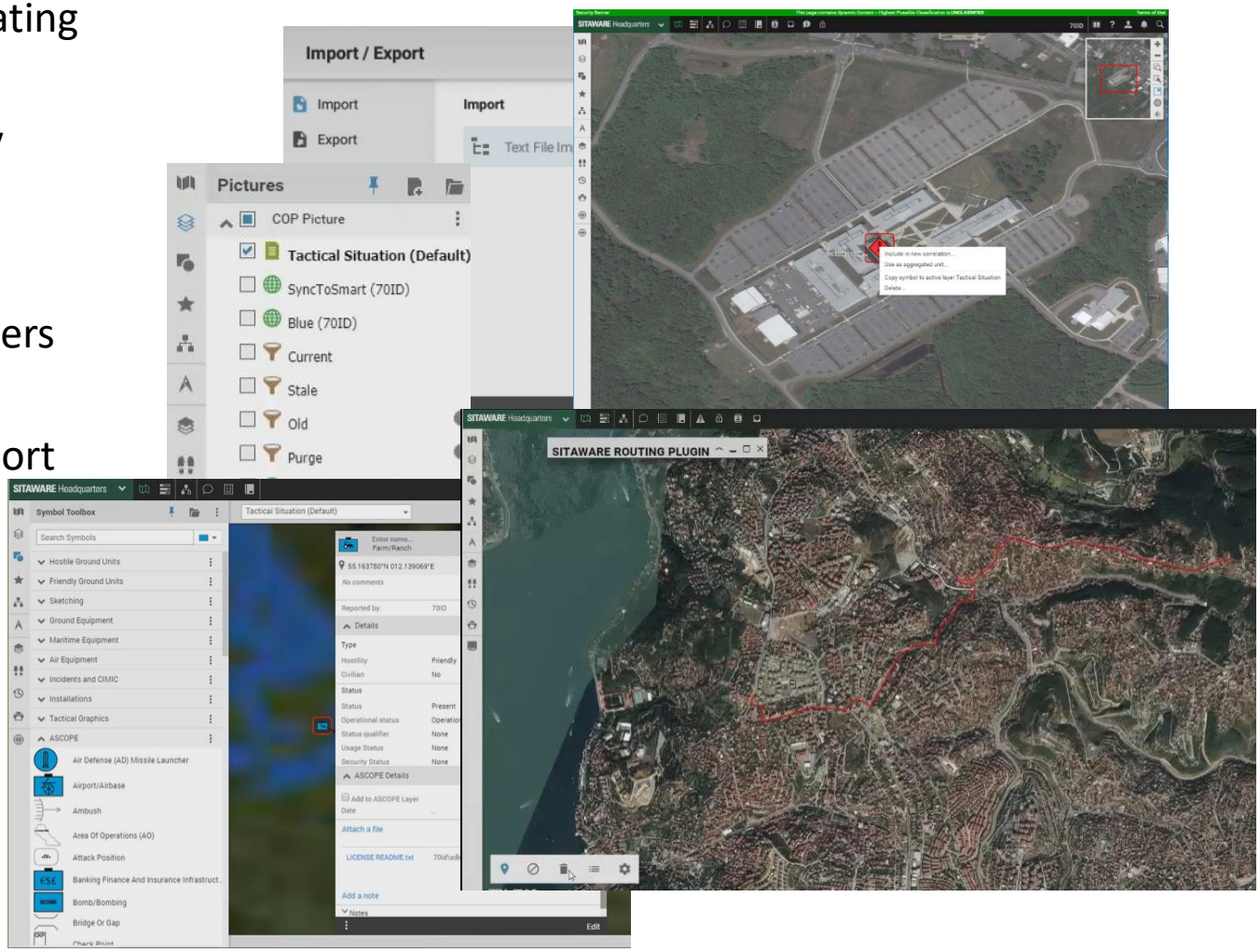
- Message Center
- Address Book
- Notifications, Alerts, Warnings
- Configuration Manager



Applications and Services are provided to be used by all

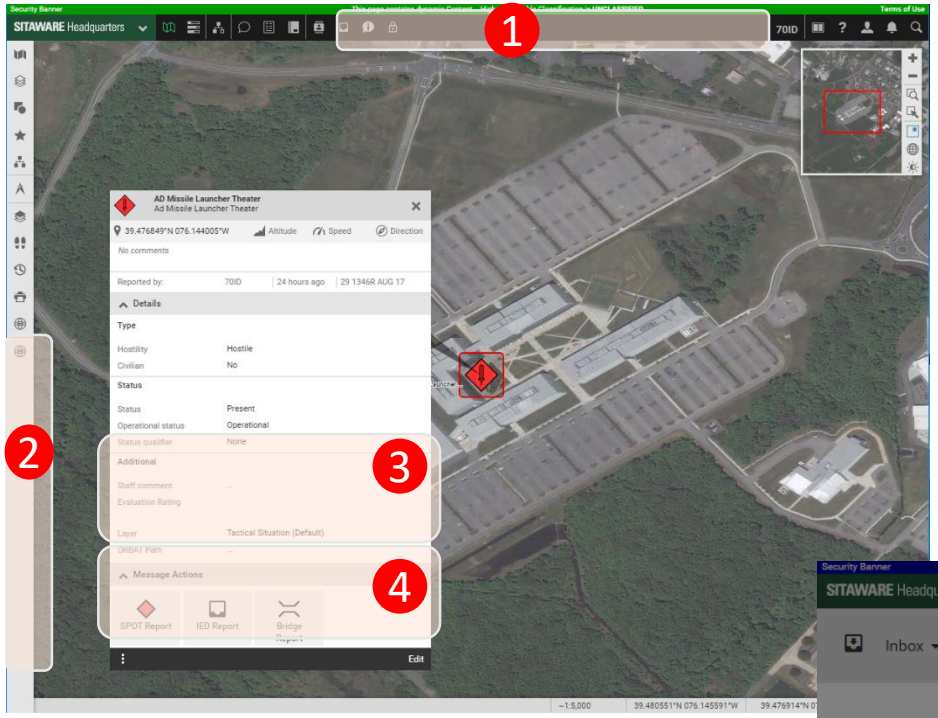
Mission Command Applications

- Common Operating Picture
- Tactical Overlay Manager
- UTO/UTR
- Operations Orders Processing
- File Import/Export
- Chat
- File Sync
- ASCOPE

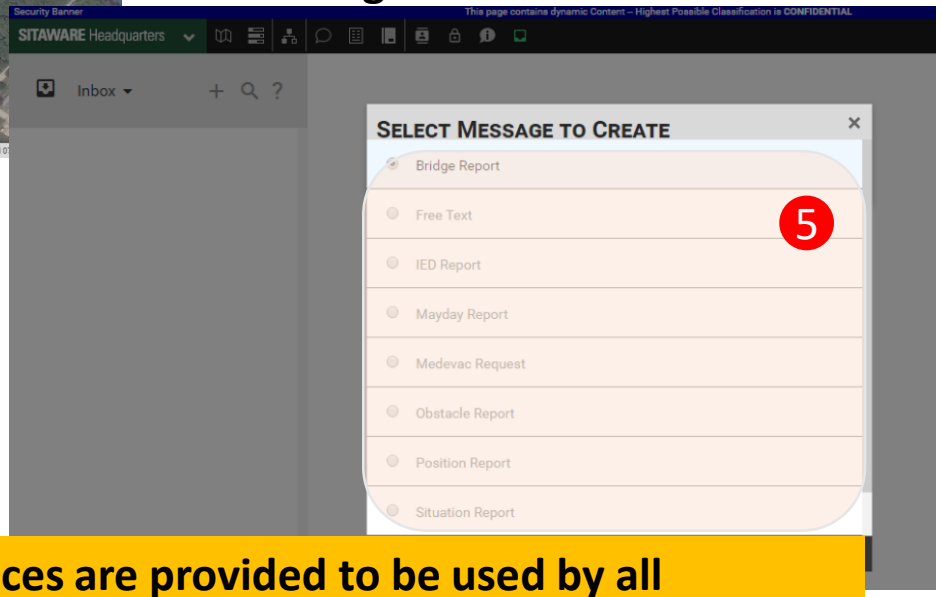


Applications and Services are provided to be used by all

Extensible Map and Message Center



1. List of available plugins
2. List of available Map plugins
3. Additional information about the symbol
4. Actions related to selected symbol
5. List of available Message Center Plugins



Applications and Services are provided to be used by all

3rd Party Integration

- External developers request access
- External developers receive PMMC SDKS & related docs
- PMMC executes IV&V and interoperability tests
- PMMC integrates external artifacts
- External developers deliver binaries and documentation

PMMC

Integration Planning
Req. Gathering
Common Build Environment

Collaborative SW Development

Gather requirements
Design
Develop
Test
Interface with CPCE/MMC

External PORs

Convergence Rubric

Level	Data Architecture	User Interface	Geospatial	Hardware
2	Full use of data architecture - data model, extended attributes, key code extension, persistence, synchronization services etc	Native web app integration into CPCE – style guide, pluggable map, common component reuse	Use common map API implementation using CPCE geospatial services	SW integrated, deployed and configured on the CPCE server stack using TSI automation
1	CPCE data interface interoperability (e.g. data bus, REST/SOAP services)	External web app embedded in CPCE or standalone app not reusing core component or style guide	Uses common renderer and map tiles provided by CPCE e.g. provide a direct feed	Standalone VM deployed using TSI automation scripts
0	Interoperability via StdV-1 standard (e.g. VMF, DDS)	Separate web page to access	Use of map tiles provided by CPCE geospatial services	TSI "blueprint" use (HW only, separate SW/deployment)
-1	No Interoperability	Thick client/separate system	Unique geospatial implementation	Unique HW

Convergence does not have to be all of nothing

CPCE v3.0 SDK

- Acquire a SitaWare License by making the request at the following url:
  - https://www.systematicinc.com/support/request-sitaware-licenses/
- All PM MC related SW requests should be sent to the following points of contact:
  - Krupal Kapadia, Krupal.s.kapadia.civ@mail.mil
  - Timothy Zirkel, tzirkel@mitre.org
- Current vendors supporting CPCE –

WSEC	AMRDEC	Banc3	S3I
NASA	Future Skies	Leidos	ESIC
General Dynamics	VES	Decision Engineering	EOIR
RII	Northrop Grumman	RII	Reinventing Geospatial

- Future Programs of Record (PoR) working towards convergence

DCGS-A	JEM	TAIS
EWPMT	JWARN	AMDWS

How can industry help?

- Short Term:
  - Help us improve the SDK - be an infrastructure contributor
  - Develop modular applications that can work in low bandwidth environments
- Mid-Term:
  - Work with PORs to develop their unique warfighting applications using the SDK
  - Develop modular applications that can be migrated into the cloud
- Long Term:
  - Build modular applications that could be "plugged" into disparate infrastructures

- POC: Krupal Kapadia
  - Email: Krupal.s.Kapadia.civ@mail.mil
  - Phone: 443-395-2279

Panel 1: Distributed Mission Command

- **Background**: Distributed Mission Command enables uninterrupted mission command throughout phases of operation, splitting operations and physical locations, minimizing forward footprints, and maintaining continuous access to services and data in support of the warfighter.
- **Problem Description**: The current network has multiple levels of identities and does not fully enable mission command. It lacks end-to-end interoperability, is very complex and fragile, not intuitive, and produces a very strong electromagnetic signature. Additionality, the network uses disparate equipment, data storage and services and moves through different layers of functionalities and transport.
- **Goal**: A network that seamlessly enables Distributed Mission Command (DMC) through leveraging the best available new technologies. Transport that is fully integrated across the network (Operational and Enterprise) and fully capable of continues secure communications. Devices will work anywhere in the world. It is intuitive in all aspects and is installed, operated and maintained by Soldiers. The Network is standardized and runs on a Common Operating Environments (COE), using common graphics, applications, and integrated data.

Panel Members

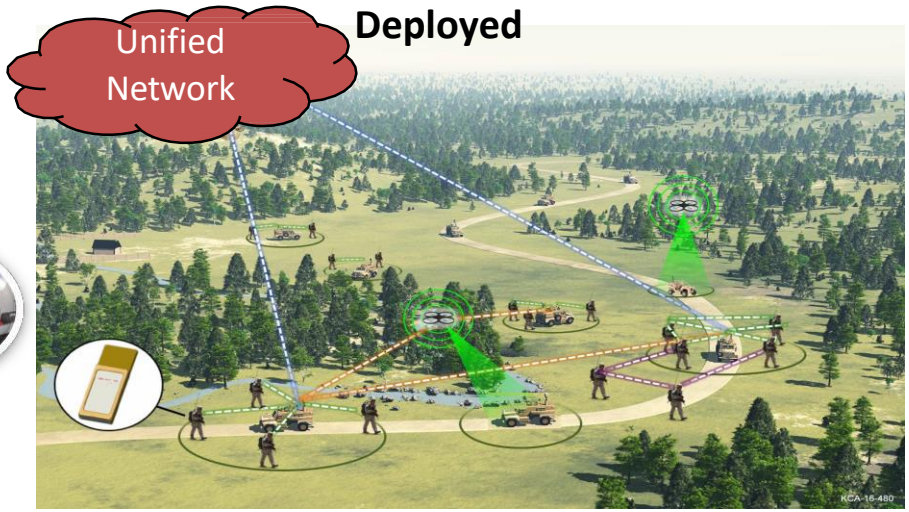
- Lead: Mr. Jeff Witsken, US Army Mission Command Center of Excellence
- CW4 Levar Gillie, FORSCOM G6
- Ryan Nilsen, MITRE Corporation
- MAJ Andrew Miller, US Army Program Executive Office- Soldier (PEO-Soldier)
- Dr. Angela Dalton, John Hopkins University Applied Physics Laboratory
- Mr. Alan Hansen, US Army Communication-Electronic Research and Development Command (CERDEC)

Distributed Mission Command & Data

Home Station

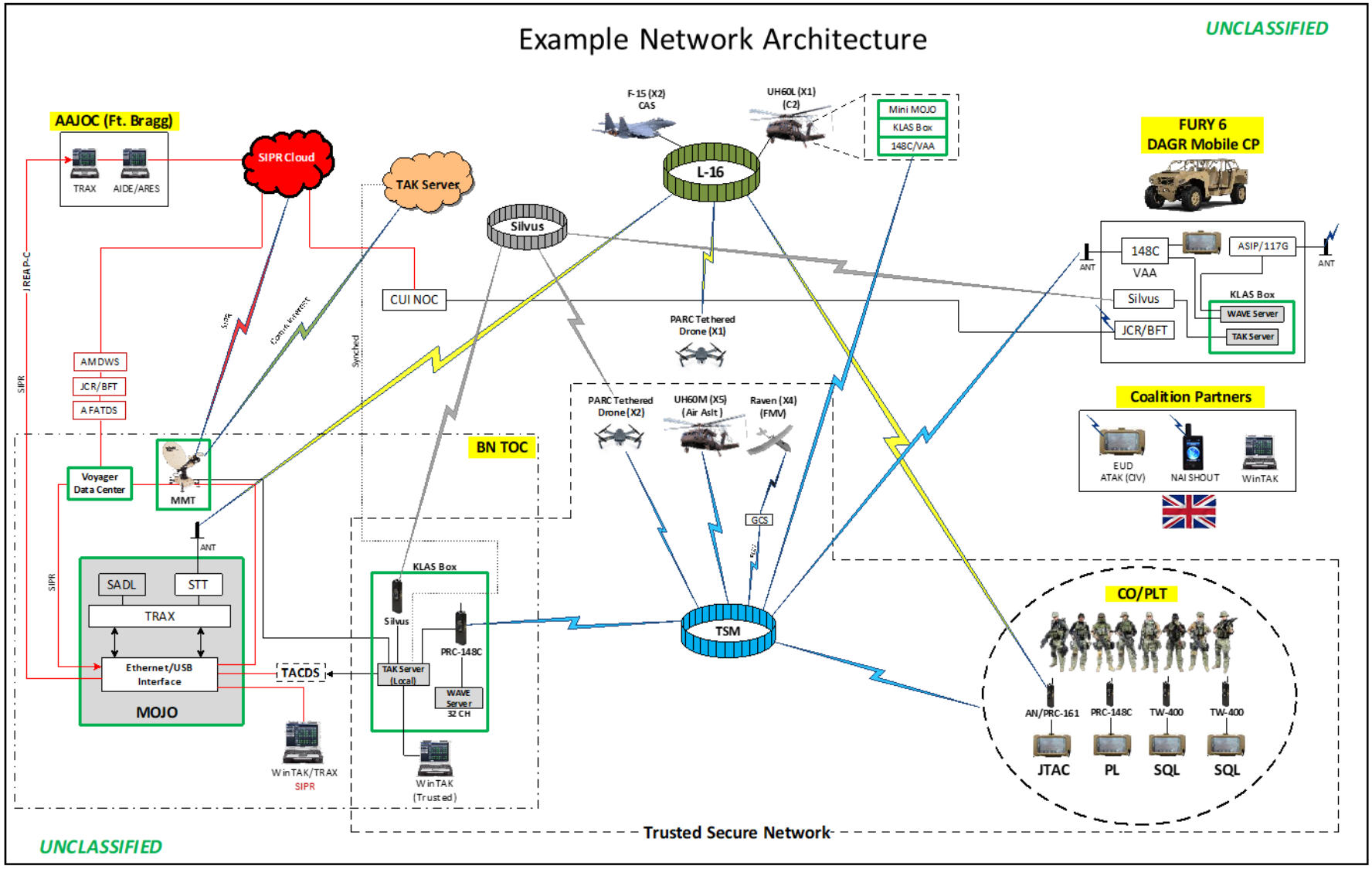
Enroute

Deployed



1. Unified suite of Mission Command applications
2.  Devices work in home station, enroute, and deployed conditions; support operations, training, and readiness as needed 
3. Devices/Applications seek multiple communication pathways, interact with transport layer for greatest flexibility, operate at the desired classification level
4. Services and Data available in all environments for 'big data' purposes (analytic models/tools)
   Data protected in transit, in storage, in process
   Local capability for disconnected, intermittent, limited conditions

Limited Bandwidth Networking

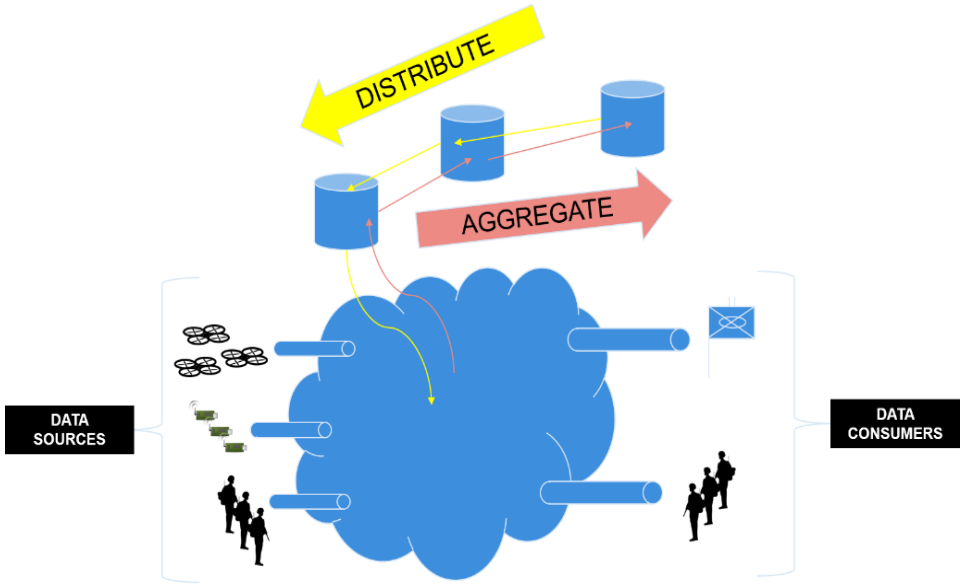


Key Gaps: Throughput, connectivity, fragmentation, ingress/egress

Objective End-State for "Data Logistics"

The Intelligent Network to Enable Information Exchange

- Aggregates data as it moves up the echelons
- Autonomously distributes data to where in the network it is operationally needed

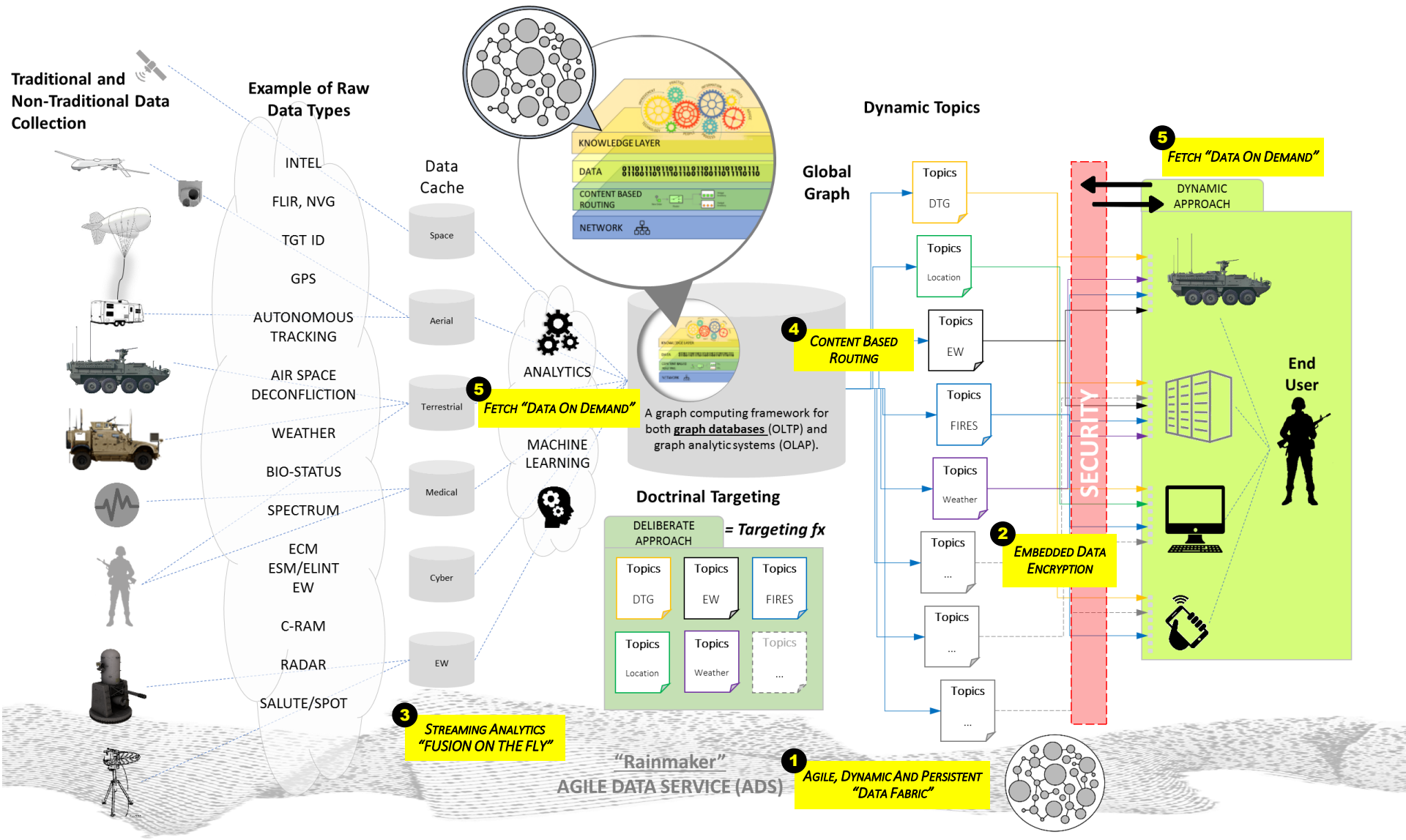


- Routes based on user data needs, not IP
- Prioritizes transmission based on mission needs
  - Most important data first, add fidelity later
- Leverages variable latency demands
  - Based on user data needs
- Uses in-network storage, data staging
- Continually senses state
  - Select links based on link capabilities, constraints, demands

Technology Enablers for Consideration

- Software Defined Networking (SDN)
- Virtualization (Network Functions, Storage, etc.)
- Machine Learning/Artificial Intelligence
- IPv6
- Named Data Networking
- Cloud Storage/Processing
- 5G Communications

Future Concepts: Agile Data Service "Project Rainmaker"



Panel 1: Key Focus Areas

1) Access to Data

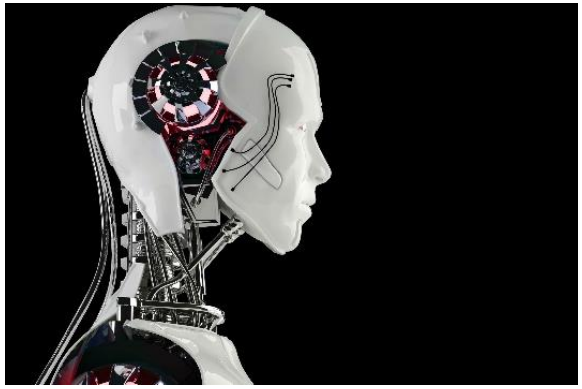
- Movement and aggregation of Data (data lakes/pools)
- Dealing with Disconnected, Interrupted, and Low-bandwidth (DIL)

2) Local Data Dissemination

- Moving critical data quickly enough to enable enhanced awareness in time critical situations

3) Use of Artificial Intelligence (AI)/Decision Tools

- Specific analytic tools that enable military decision making at each level



Panel 2: Infrastructure

- **Background**: Distributed Mission Command enables uninterrupted mission command throughout phases of operation, splitting operations and physical locations, minimizing forward footprints, and maintaining continuous access to services and data in support of the warfighter
- **Problem Description**: Army Units are not aligned on a single baseline – often requiring units to integrate legacy technology into advantaged environments. The Army has unique constraints to include temporary infrastructures, moderate to limited connectivity, SWaP constraints (2 man carry max), power & cooling fluctuations and irregular shut down & restart.
- **Goal**: Leverage the best available new technologies to enable seamless, secure and robust HW & SW infrastructures to be installed, operated and maintained by Soldiers.

Panel Members

- Lead: Bradford Stevenson, US Army Communication-Electronic Research and Development Command (CERDEC) CP&ID
- CW3 James Ellington, FORSCOM G6
- Scott Camden, ASA(ALT) Office of the Systems Engineer
- Jason Regnier, Program Executive Office- Soldier
- Shannon Jones, Program Executive Office C3T Tactical Networks

The Expeditionary Force

An expeditionary force is deployed in a task-organized form on short notice to austere locations and is capable of conducting operations in complex terrain immediately upon arrival.

What is an expeditionary infrastructure?

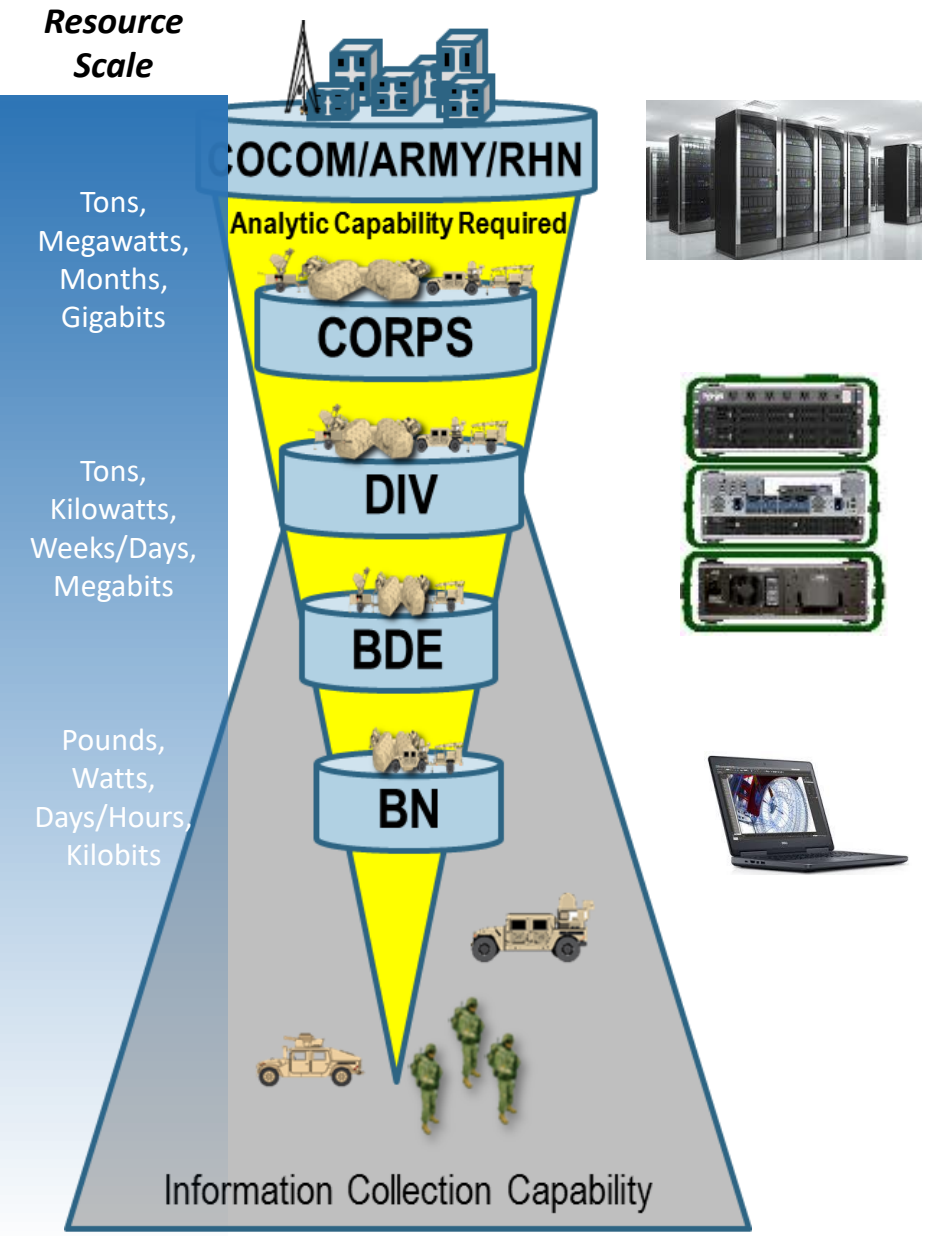
Task-Organized, Short Notice
Discover & share resources, services, workloads, ad-hoc architecture & arbitrary scale, without rebuild

Complex Terrain
Robust & adaptable networks, ruggedized hardware

Austere Locations
Small footprint, low power, intermittent/no comms

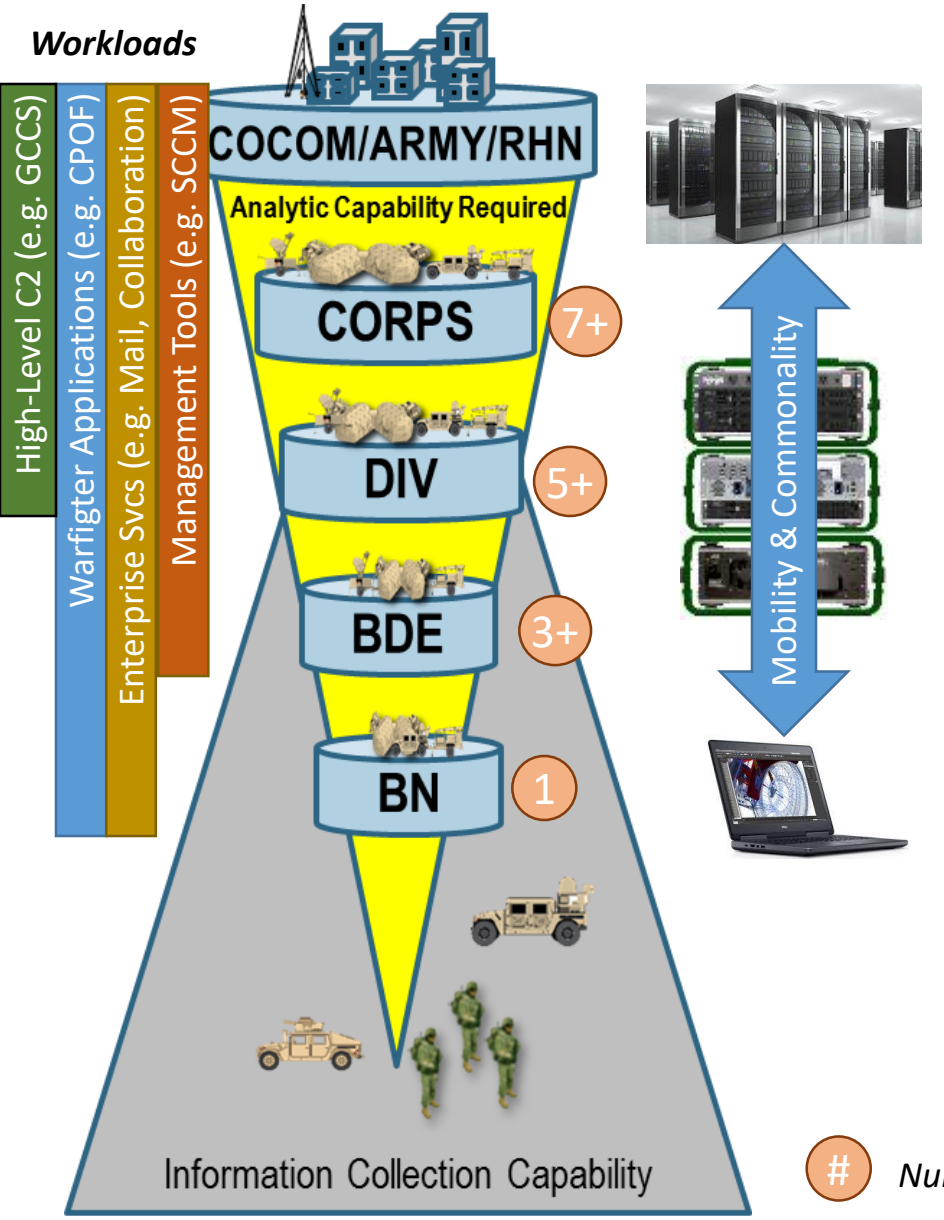
Immediately Upon Arrival
High availability, ability to operate on the move, rapid start from cold boot

HW Infrastructure Challenges



- Intersection of Commonality & Granularity
  - Granularity to select "just enough" resources for mission
  - Commonality to minimize training & logistics burden (overlap w/ software)
- Ruggedized for survivability
- Server-grade componentry all the way to smallest form factor
- Minimal cable interconnects, simple wiring to facilitate rapid standup/teardown
- Cybersecurity
  - Anti-tamper / Tamper Evident
  - Supply Chain Risk Management
- Standards Compliance

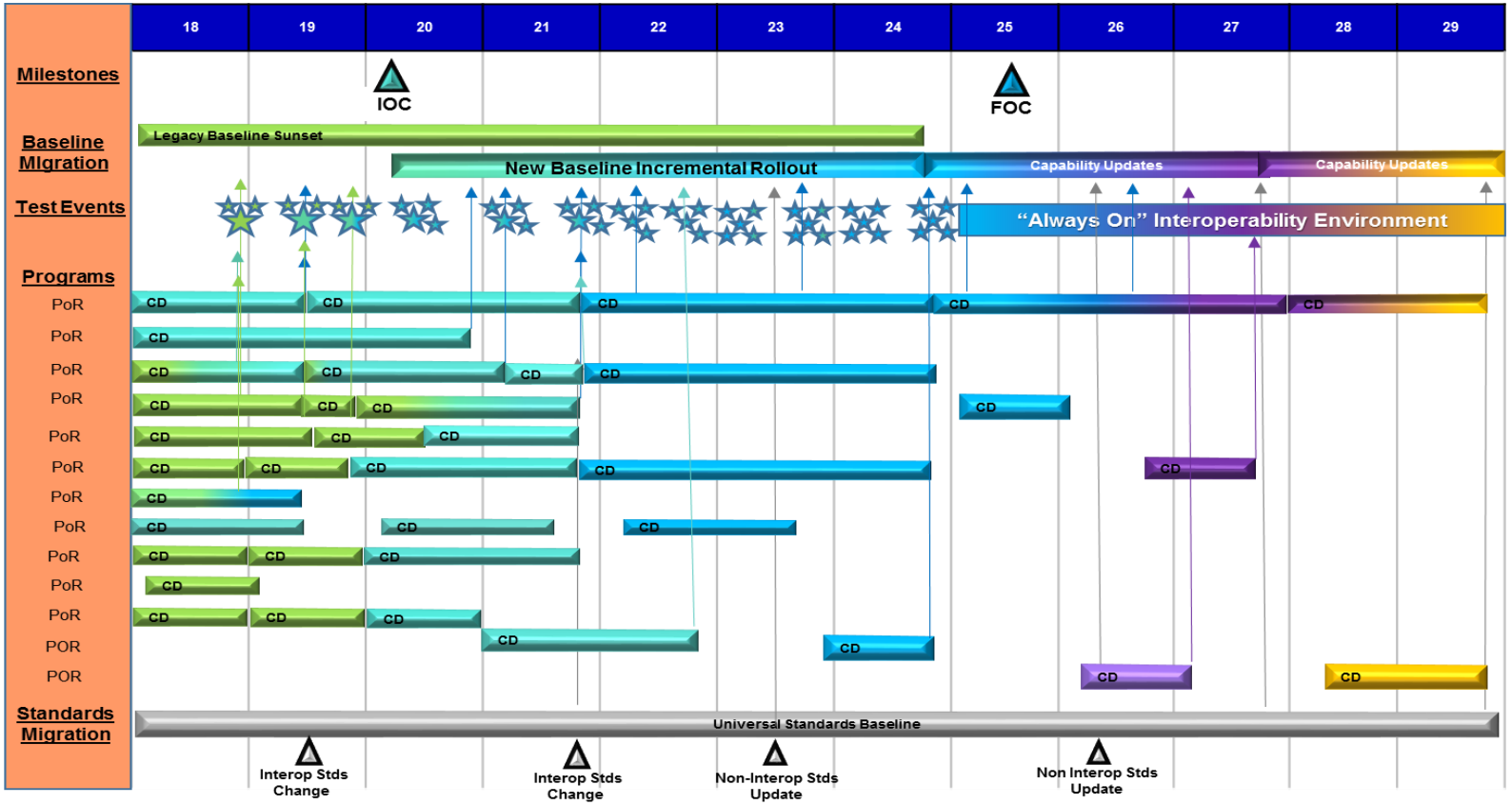
SW Infrastructure Challenges



- Workloads are monolithic, VM-Based
  - Only scaling is to increase or decrease resources per VM
  - Drives high licensing costs, complexity, over-provisioning of resources
  - Resources scale down, nature of software doesn't
- No ability to compartmentalize workloads in different security enclaves, increasing SWaP
- Infrastructure software doesn't scale well to echelons below the datacenter
- Reliance on legacy software entrenches reliance on conventional virtualized workloads
- Complexity & User Training
  - Leaning heavily on automation to reduce complexity, resulting in workforce expertise that's "brittle"
  - Too often the solution to a failure is to rebuild

Number of security enclaves

"IT Box" Incremental Delivery



Need industry ideas in order to support the incremental build of the COE infrastructure & cross cutting capabilities:

- Distributed Integration & Interoperability Test Environment
- Automated Test Procedures
- Automated interoperability test cases that produce data w/o operators
- Virtualized representations of Army formations/units

Network Infrastructure Challenges

- **Problem Description**
  - Units are predominantly equipped to support Command-Post-centric operations, with minimal data and bandwidth capabilities at company and below echelons

- **Current challenges**
  - Disconnected environments
  - Aging transmissions terminals (10 or more years old)
  - Spectrum de-confliction
  - Transport burden of long-haul comms
  - Classification of information and required infrastructure to support it
  - Supporting logistics infrastructure

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Panel 2: Key Focus Areas

1) **Scale** - HW & SW solutions that work at multiple scales (flexibility to scale down to tactical environment

2) **Flexibility** - Need Infrastructure & Architecture to compliment each other so that we can provide integrated and synchronized data and transport to support modularity
   - Includes classification of data at different levels & disconnected environments

3) **COE** -
   - Distributed Integration & Interoperability Test Environment
   - Automated Test Procedures
   - Automated interoperability test cases that produce data w/o operators
   - Virtualized representations of Army formations/units

Panel 3: Distributed Tactical Computing Environment

- **Background:** Army's common operating environment (COE) provides common IT standardization across the tactical and enterprise environments.

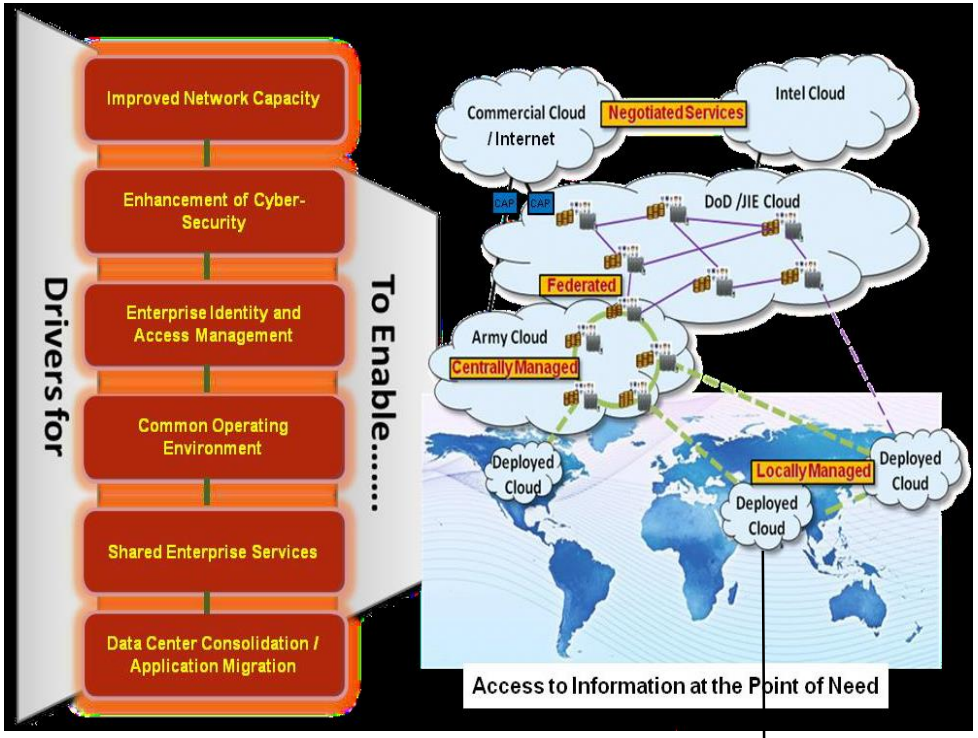
- **Problem Description:** We need to effectively share common services between tactical and enterprise environments and enable seamless sharing of data within the Army enterprise as well as with mission partners.

- **Goal:** A fully integrated, secure enterprise computing environment that allows tactical and non-tactical users to communicate and share data across Joint and Global environment without technical barriers.

Panel Members

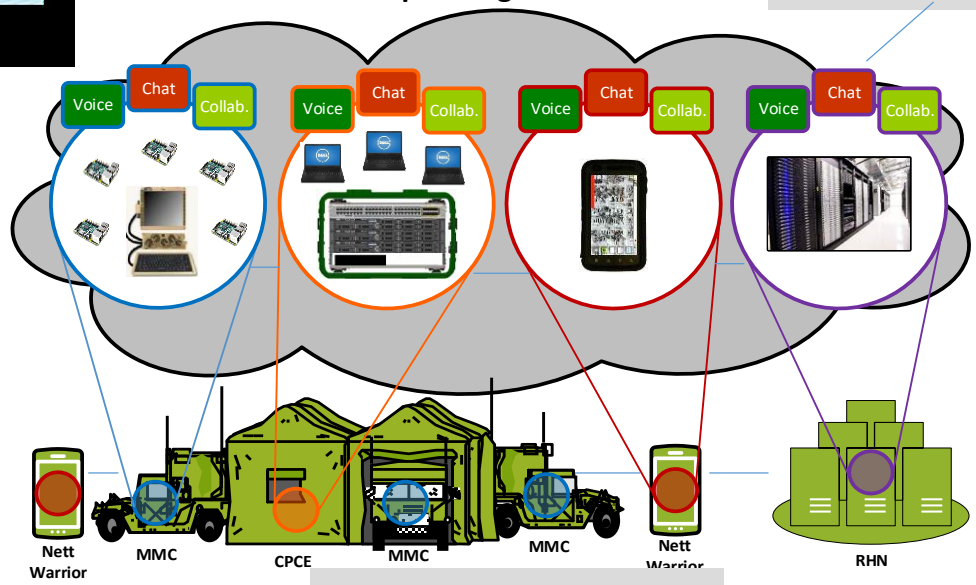
- Lead: Thomas Sasala, (SES) HQDA CIO/G-6
- Mr. Tom Neff, PEO EIS
- CW3 Shawn Lamb, FORSCOM G6
- Mr. Jerry Harper – PEO C3T/Mission Command
- Mr. Frank Geck, CERDEC S&TCD
- Mr. Bill Urrego, Mitre

End to End Cloud Computing



- Synchronization between on/off premise and operationally deployable cloud capabilities
- Optimal mix of approved government and commercial cloud service
- Utilization of cloud computing to enable end to end data availability, aggregation & sharing

- Enabling modernization and consolidation
- Using platforms to intelligently deliver the right capability to the user
- DevOps: Build, Test & Deploy with Security
- Synchronizes data & transport



Enterprise Cloud Strategy

- Army has approximately 8000* applications across the enterprise (including tactical)
- OMB mandate to close data centers since 2011; Army making progress but slowly
- Commercial sector continues to outpace DoD and Army on cloud technologies
- Off-premises cloud services now viable for wide-spread adoption
- Some technology, policy, and regulation barriers slowing migration and adoption

Key Cloud Features:
- Secure, Accessible
- Resilient, Survivable
- Elastic, Dynamic, On-Demand
- AI-Ready, Automated, Self Serve

Goals and Objectives

- Meet Commander's requirements in a timely manner
- Increase survivability, resiliency, and security of mission data and services
- Provide an agile, flexible, and responsive IT environment
- Reduce labor intensive manual processes through automation
- Decrease total cost of IT enterprise operations in support of warfighter
- Fully align tactical and non-tactical computing infrastructures to create a seamless environment for users

Recommended Strategy

- Establish approved *hybrid* hosting environments
- *Assist* and *incentivize* mission owners through cost sharing
  - Up to 100% of costs; 50% of modernization and hosting
- Migrate ~80% of enterprise systems to *commercial* hosting
  - ~50% off-premises, ~20% on-premises (COCO)
- Use DoD solutions (e.g., milCloud 2.0) for *sensitive* apps
- Maintain "antique" environment for 10% of apps
- Consolidate cloud service acquisition on ACCENT contract

Key Take Away

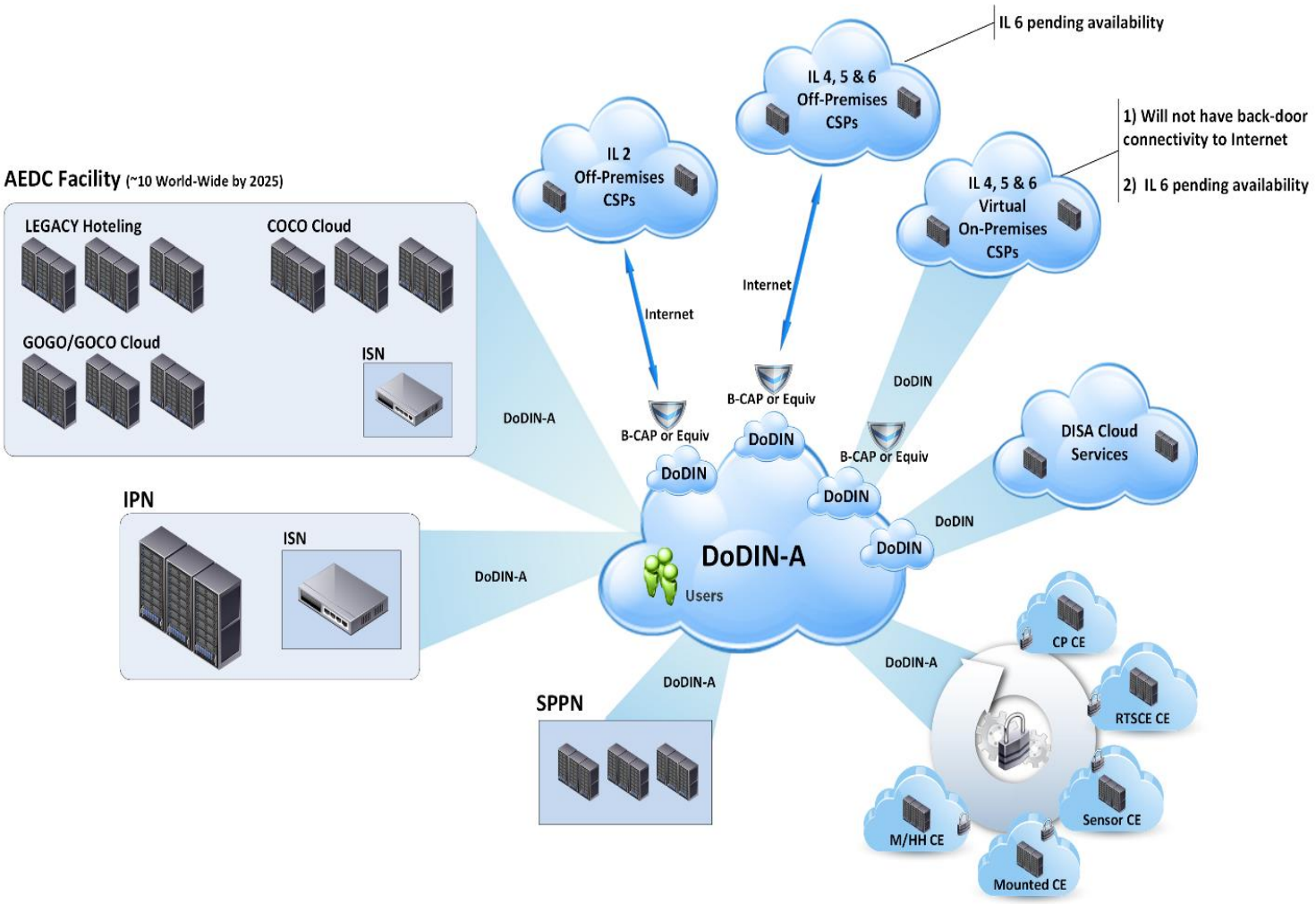
- Army has a *hybrid* cloud strategy; *no single solution* meets *all* the requirements
- CIO/G-6 *incentivizing* application owners *to move* to the cloud starting in FY19
- Centralized *contract available* for use *today* for anyone in the DoD

* Total Asset Visibility project will create a complete and accurate inventory

Enterprise Computing Environment

- Army needs an enterprise computing environment (ECE) that transforms application hosting and delivery of information technology (IT) resources for more effective decision making and mission outcomes
- ECE will host mission systems, applications, services and data, accessible to enterprise and forward-deployed users
- ECE must have a cloud-based security architecture that enables the rapid development and deployment of cloud native applications
- ECE will leverage disruptive technologies such as machine learning & artificial intelligence
- ECE must support data analytics for the warfighter, mitigates capital investments, and provides an elastic capability that bridges tactical and non-tactical users

Enterprise Service Architecture

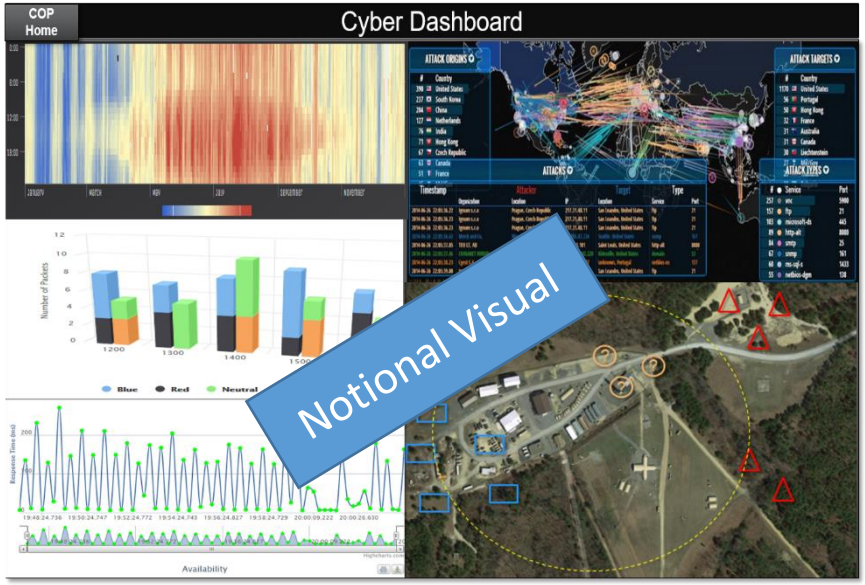


Enterprise Computing Environment

Mission Command Cyber

Cyber Situational Understanding (Cyber SU)

- Provides tactical picture and understanding of "blue" health and "red" threats
- Correlates data to enable seeing larger patterns, while reducing cognitive loading
  - ***Crawl***: Know yourself (correlated health and status of compute, apps, networks, etc.)
  - ***Walk***: Know your battlespace (correlate enemy activity)
  - ***Run***: Understand battlespace (impact to mission and how to adapt) via machine learning



Tactical Defensive Cyber Operations (DCO) Infrastructure (TDI)

- Monitors systems and networks for issues & attacks
- Enables local and global cyber defense
  - ***Crawl***: Monitor and defend basic infrastructure
  - ***Walk***: Monitor and defend more systems and network devices. Increase coverage
  - ***Run***: Continue to increase coverage and forensics capability

Ideas from Industry:

- Gain an understanding of cyber related data (health and status of network, operational mission impact, etc.)
- Data Logistics—limited bandwidth to move data over LAN and WAN
- Tactical Storage and Compute to defend and achieve a Cyberspace understanding – limited SWaP

Secure Distributed Computing Tactical Challenges & Problems

- **The tactical edge has limited bandwidth and Size, Weight and Power (SWaP) constraints**
- **Currently need to support/isolate different classification levels of systems and data**
- **Single points of failure, e.g., lack of resiliency, lack of automation**
  - Most tactical systems have a single point or are the single point of failure themselves for a particular capability
- **A single piece of vulnerable software can compromise an entire system/OS/VM**
  - Skilled warfighter intervention required upon cyber attack or hardware failure to regain functionality, if at all possible in the field
  - Downtime affects mission success

Cloud Barriers & Challenges

- **CSSP/Cybersecurity:**
  - Security in the cloud requires different thinking; security shared between the gov and provider
  - Currently defined roles and responsibilities not sufficient to address the new security model
- **Contracting:**
  - Limited number of cloud-specific acquisition vehicles; potential ceiling challenges
  - Regulations limit ability to leverage cloud capabilities & commercial service model offerings
  - KOs need to acquire additional experience/training in awarding and managing cloud contracts
- **Technology:**
  - Significant reengineering of applications may be necessary, especially among PORs
  - Application modernization not funded and limiting factor to cloud adoption
  - Army does not have requisite talent to perform all modernization and migration requirements
  - RMF requirements add additional time and cost to modernization and migration efforts
- **Business Case Analysis/Cost Benefit Analysis:**
  - BCA/CBA requirements are taxing with little benefit
  - Time and resources spent to conduct BCA/CBA outweigh benefits

Key Take Away

- Army has a *hybrid* cloud strategy; *no single solution* meets *all* the requirements
- CIO/G-6 *incentivizing* application owners *to move* to the cloud starting in FY19
- Centralized *contract available* for use *today* for anyone in the DoD

Panel 3: Key Focus Areas

- Create bandwidth efficient and secure methods for movement of data
- Analytics of Cyber Understanding - relationships of cyber data & display for ease of use by staff (health and status of network, operational mission impact, etc.)
  - How does critical cyber data move around the battlespace from a tactical environment to enterprise network with time sensitivity and analytics and forensics needs
- Propose new ways of architecting tactical environment to be able to share data seamlessly, overcome bandwidth and complexity obstacles from the tactical environment to the enterprise
- Solutions needed for on-demand, software defined networking and dynamic movement of data where 'as a service' can be beneficial
- Study on what data and services can be moved to the enterprise cloud and still be reachable and available to the tactical users

Use modern concepts but adapt to realities of the Army Tactical Network

Panel 4: Mission Partner Environment

- **Background**: The US Army will conduct unified land operations and multi-domain operations with joint, interorganizational/interagency, and multinational (JIM) partners. Our Army requires the speed, strength and readiness to be interoperable with JIM partners to meet military and political objectives. The Mission Partner Environment (MPE) Network provides the US Army and JIM partners the means to achieve interoperability readiness in military operations.
- **Problem Description**: US Army Warfighting units are equipped to operate on two primary DOD security domains (US Secret and Unclassified). In today's environment contingencies and operations are typically fought on a Secret Releasable security domain to facilitate information sharing with JIM partners. These Secret releasable domains are often temporary in nature and require additional hardware/software solutions for each instance which is unsustainable. The Army must develop an MPE Network solution which leverages technology to facilitate flexible and adaptive information sharing without increasing the footprint and complexity for the user.
- **Goal**: Determine how the US Army modernizes the force to achieve the interoperability capabilities necessary. Partner with industry and JIM partners to deliver solutions to improve our collective interoperability readiness.

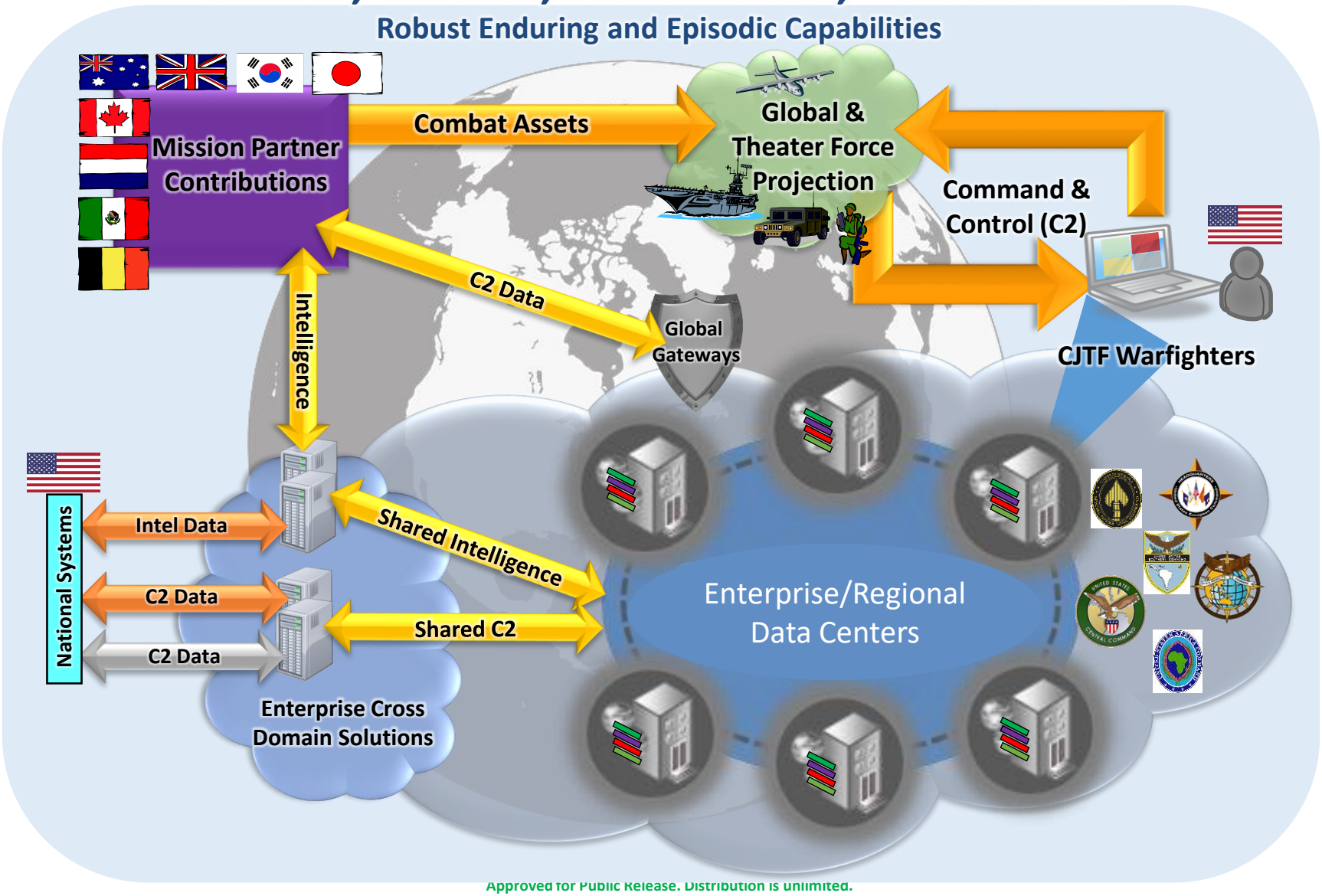
Panel Members

- Lead: COL Eulys "Bert" Shell, US Army Joint Modernization Command
- CW4 Joshua Frazee, FORSCOM G6
- Phil McDonald, DOD Chief Information Office
- LTC Joseph "Joe" Selken, US Army CIO-G6
- LTC Shermoan Daiyaan, US Army PEO C3T Mission Command
- MAJ Greg Bew, US Army Cyber Command

DOD MPE Architecture

Global, Virtual, Automated, "Cloud-like"

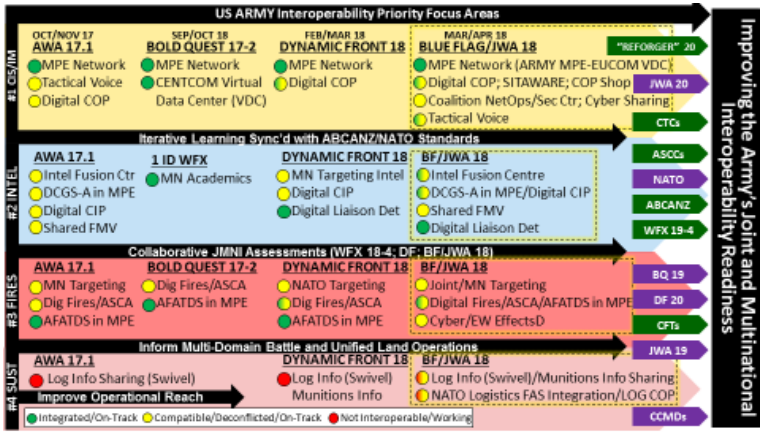
Robust Enduring and Episodic Capabilities



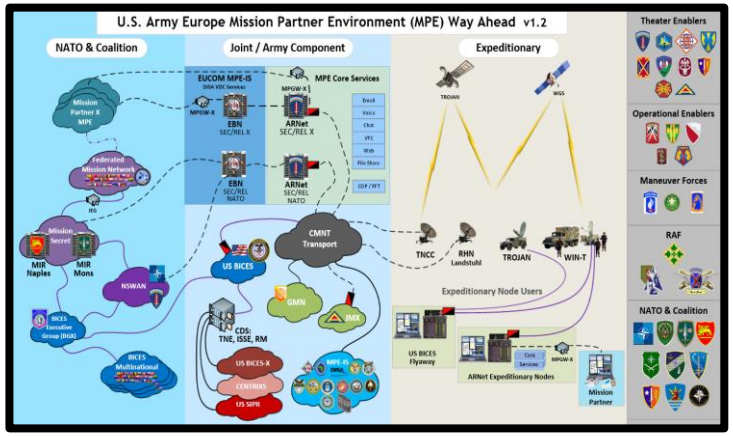
Army Interoperability Priority Focus Areas

- **US Army Interoperability Priority Focus Areas**:
  - Communications and Information Systems (CIS)/Information Management (IM)
  - Intelligence
  - Digital Fires
  - Sustainment
- **Standards:**
  - America, Britain, Canada, Australia, New Zealand (ABCANZ) Program Armies
  - North American Treaty Organization (NATO)/Federated Mission Networking (FMN)
- **Major Interoperability Exercises:**
  - Warfighter Series (WFX)—Readiness Focus
  - Joint Warfighting Assessment—Operational Experimentation Focus

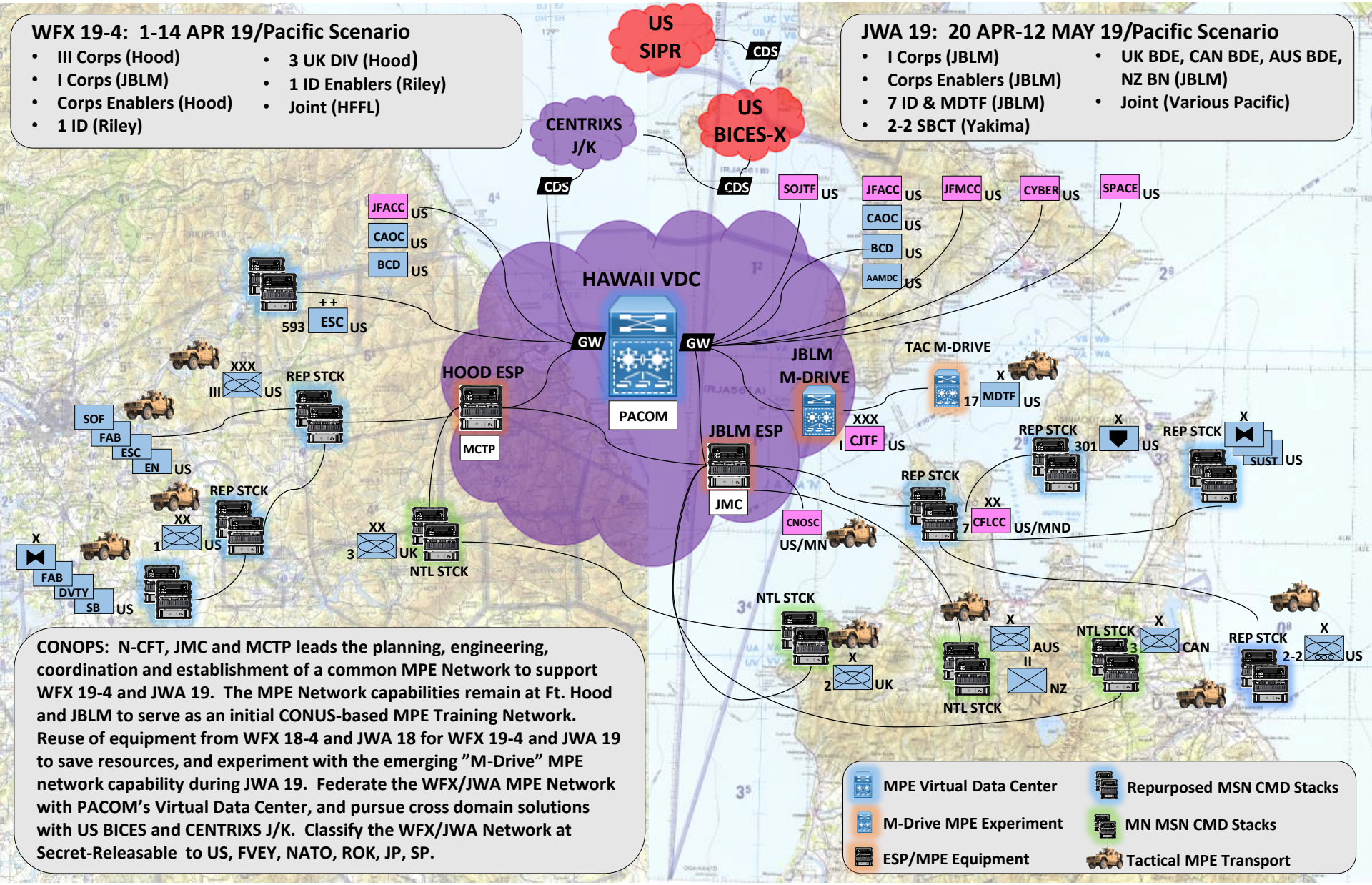
Interoperability Concepts and Capabilities



Force Interoperability Readiness



DRAFT WFX 19-4 and JWA 19 MPE Network CONOPS



CONOPS: N-CFT, JMC and MCTP leads the planning, engineering, coordination and establishment of a common MPE Network to support WFX 19-4 and JWA 19. The MPE Network capabilities remain at Ft. Hood and JBLM to serve as an initial CONUS-based MPE Training Network. Reuse of equipment from WFX 18-4 and JWA 18 for WFX 19-4 and JWA 19 to save resources, and experiment with the emerging "M-Drive" MPE network capability during JWA 19. Federate the WFX/JWA MPE Network with PACOM's Virtual Data Center, and pursue cross domain solutions with US BICES and CENTRIXS J/K. Classify the WFX/JWA Network at Secret-Releasable to US, FVEY, NATO, ROK, JP, SP.

Common Operating Environment Problem Set

MC / C2 / Maneuver

CPOF

JBCP TOC KIT

CMD Web

TIGR Core Server

TIGR Client

TIGR Standard Server

Intelligence

DCGS-A MFWS

DCGS-A WS GEOINT & TGS

Fires

AFATDS

AFATDS EMT

JADOCS

Airspace Mgmt/Def

TAIS

TAIS

TAIS AWS

AMPS

FAAD C2I / C-RAM

AMDWS

ADAM Cell

C-RAM

Server Infrastructure

BCCS

DCGS-A IFS

TMC Gateway

Server Mgmt Console

Server Mgmt Console

Future State

TSIv2 and Laptop Server

CP Infrastructure

SIPR, NIPR VOIP

Protection

JWARN/JEM ENGINEERS

Sustainment

CSS VSAT

Network Mgmt

JTNT

Network Management

NETOPS

Panel 4: Key Focus Areas

Hardware and Software solutions for:

- Tactical Multiple Enclaves
- Interoperable Combat Net Radios
- Logistics and Sustainment Capabilities
- Common Operational Picture Collaborative Tools
- Crypto Solutions
- Software Cross-Domain Solutions
- Compressed Full-Motion Video Capabilities

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WHAT'S NEXT

White Paper Process




Industry Focus Areas

Panel 1

- Access to Data
  - Movement and aggregation of Data (data lakes/pools)
  - Dealing with Disconnected, Interrupted, and Low-bandwidth (DIL)
- Local Data Dissemination
  - Moving critical data quickly enough to enable enhanced awareness in time critical situations
- Use of Artificial Intelligence (AI)/Decision Tools
  - Specific analytic tools that enable military decision making at each level

Panel 2

- Scale- HW & SW solutions that work at multiple scales (flexibility to scale down to tactical environment
- Flexibility- Need Infrastructure & Architecture to compliment each other so that we can provide integrated and synchronized data and transport to support modularity
  - Includes classification of data at different levels & disconnected environments
- COE:
  - Distributed Integration & Interoperability Test Environment
  - Automated Test Procedures
  - Automated interoperability test cases that produce data w/o operators
  - Virtualized representations of Army formations/units

Panel 3

- Put compute where the data is
  - Distributed compute: TDI pre-positions compute at tactical units
- Create bandwidth efficient and secure methods for movement of data
- Analytics of Cyber Understanding- relationships of cyber data & display for ease of use by staff (health and status of network, operational mission impact, etc.)
- Propose new ways of architecting tactical environment to be able to share data seamlessly, overcome bandwidth and complexity obstacles

Panel 4

- Tactical Multiple Enclaves
- Interoperable Combat Net Radios
- Logistics and Sustainment Capabilities
- Common Operational Picture Collaborative Tools
- Crypto Solutions
- Software Cross-Domain Solutions
- Compressed Full-Motion Video Capabilities

AMERICA'S ARMY
THE STRENGTH OF THE NATION

Market Research Process Flow

Government

TEM 2

Panel 1: Data Logistics
Panel 2: Infrastructure
Panel 3: Distributed Tactical Computing Environment
Panel 4: Mission Partner Environment

White Paper Review

Panel 1: Data Logistics
Panel 2: Infrastructure
Panel 3: Distributed Tactical Computing Environment
Panel 4: Mission Partner Environment

Shark Tank

Decision Point

1-2 Aug	2 Aug-14 Sep	15 Sep-5 Oct	6-26 Oct	29 Oct-2 Nov	Mid Nov→

Submission Deadline
14 Sep

White Papers
PDF E-Mail Submission

Invitation to Shark Tank

Demonstration Preparation

Industry

Army Tactical Cloud Industry Day
2 Aug 2018

Doing Business with the Army

Ms. Andrea S. Armstrong
Director, OSBP-APG

OSBP-APG

Higher Headquarters

GEN Gustav F. Perna
CG, AMC

MG Randy Taylor
CG, CECOM

Mr. Kenyata L. Wesley
Exec Director, ACC-APG

Mr. Larry Muzzelo
DCG, CECOM

APG, MD

NCD - Natick Contracting Division
RTP - Research Triangle Park Division
ACD - Adelphi Contract Division
ECD - Edgewood Contract Division
- - - OPCON to CECOM

Office of Small Business Programs
Team of Trusted Small Business Professionals

Ms. Andrea S. Armstrong
Director, OSBP-APG

ACC-APG

CECOM → Tobyhanna Army Depot → Fort Huachuca AZ → Fort Belvoir VA

U.S. ARMY RDECOM → NCD, RTP, ACD, ECD

CORE FUNCTIONS

MISSION

To promote acquisition opportunities where small businesses can support World-Class C4ISR Systems, Battle Command, Research, Development and Engineering for the readiness of the Army, Joint Warfighter and the Nation

VISION

Integrate and operationalize small businesses into the contract rotation supporting mission requirements for Innovative Solutions and Emerging Technologies

FY18 OSBP-APG Initiatives

Obsolescence	• Solutions that mitigate parts obsolescence challenges experienced by CECOM & C4ISR PEOs
Cybersecurity/ Technology	• Near-term/far-term cyber technology and other **innovative** and **emerging technology**
Research & Development/S&T	• Need industry partners who can identify, pioneer, and master R&D/ Science & Technology to **mitigate** and **fill** the Army's unmet capability gaps
Supply Availability	• Solutions to ensure Soldiers have **on time** availability of needed parts
Sustainment	• Solutions **enabling** effective POR **transition to sustainment** that **reduce** costs, minimize obsolescence, and **foster readiness**

SBO outreach events will be focused on these 5 initiatives. SB and OTSB Industry Partner's can utilize programs such as the Mentor-Protégé Program and attend events such as the Advance Planning Briefing to Industry for Acquisition Opportunities.

OSBP-APG: 443-861-4340
Webpage: https://osbp.apg.army.mil
Vendor KIOSK: https://osbp.apg.army.mil/Home/SmallBusinessCompany

POR: program of record

Team-APG

The Home of Innovation and Opportunity

- *6 Centers of Excellence; 3 Separate Installations*
- *6th Largest Employer in Maryland*
- *Over 21,000 Military, DA Civilians & Contractors*
- *$6.5B Economic Impact on the Region*
- *$2.4B to Small Business in FY17*
- *APG STEM Outreach*
- *Home of the Maryland Freestate ChalleNGe Academy*
- *Home to one of the Army's 12 original Sexual Harassment/Assault Response Prevention Resource Centers*

Research & Development

C4ISR (Command, Control, Communications, Computers, Intelligence, Surveillance, Reconnaissance)

Public Health Sciences

Test & Evaluation

ChemBio (Chemical & Biological)

PSI (Personnel Security Investigation)

Who We Support

CECOM/C4ISR

Logistics Sustainment Planning

Software Sustainment

Foreign Military Assistance

Depot-Level Reset & Overhaul

Field Support

IT Systems Engineering & Integration (Non-tactical)

Supply Chain Management

Cyber Interoperability Certification

Bio surveillance Technology

ICT Human Computer Interaction

Reliability Technology

Detecting Chemical War Agent in Munitions

SMDC-ONE Nanosatellite

PackBot 510 Robot

Phantom Head EEG Graph Neural Patterns

Head Health Challenge

Types of Requirements

- Aviation Communications
- Communications and Equipment
- Cybersecurity
- Engineering and Logistical Support
- Intelligence and Electronic Warfare
- Mines/Countermines
- Navigation Technology and Equipment
- Network/Cloud
- Night Vision Equipment
- Power Generation
- Radars
- Research and Development (Physical Engineering and Life Sciences)
- Sensors
- Software Engineering
- Tactical Radios and more…

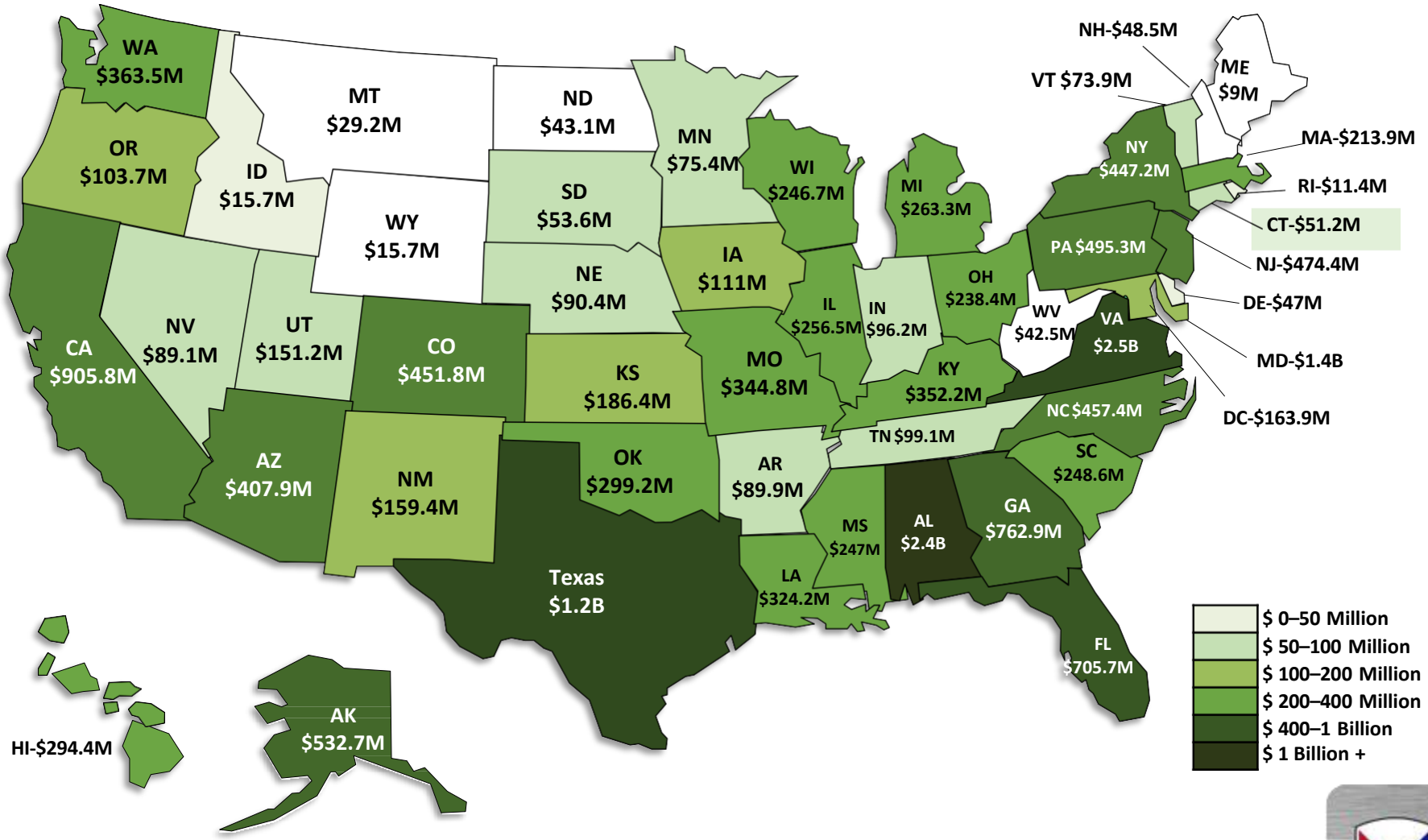
Base Sustainment Services

- Environmental Services
- Grounds Maintenance
- Facilities Maintenance
- Janitorial Services
- Landscaping
- Minor Construction
- Major Construction
- Plumbing
- Paving
- Road Construction
- Roofing
- Solid Waste Collection
- and more …

Speed
Precision
Success

FY17 Army Small Business Spend

Total: $18.9B



Data Source: FPDS-NG Small Business Achievements by Awarding Organization Report Adhoc with Vendor State, *As of 30 Sep 17

FY17 OSBP-APG SB Goal/Achievements

As of 30 September 2017

CECOM-C4ISR

CATEGORY	FY17 GOALS %	Actual % 30-Sep-16	FY16 SB Eligible $5.2 B	Actual % 30-Sep-17	FY17 SB Eligible $5.4 B
SB	14.00%	22.21%	$1.2 B	20.99%	$1.1 B
SDB	4.00%	12.29%	$639.2 M	10.90%	$583.8 M
HUBZone	0.80%	1.31%	$68.0 M	1.97%	$105.7 M
WOSB	3.00%	5.44%	$282.9 M	5.22%	$279.3 M
SDVOSB	3.00%	5.29%	$275.1 M	4.51%	$241.4 M

RDECOM

CATEGORY	FY17 GOALS %	Actual % 30-Sep-16	FY16 SB Eligible $3.3 B	Actual % 30-Sep-17	FY17 SB Eligible $3.6 B
SB	33.00%	36.34%	$1.2 B	34.94%	$1.3 B
SDB	8.00%	12.14%	$394.7 M	10.71%	$384.4 M
HUBZone	1.00%	1.04%	$33.9 M	1.26%	$45.2 M
WOSB	4.00%	6.33%	$205.7 M	7.33%	$263.1 M
SDVOSB	4.00%	5.58%	$181.3 M	5.01%	$179.6 M

FY18 OSBP-APG SB Goal/Achievements

As of 25 July 2018

CECOM-C4ISR

CATEGORY	FY18 GOALS %	Actual % 25-Jul-17	FY17 SB Eligible $4,316,544,735	Actual % 25-Jul-18	FY18 SB Eligible $5,159,353,502
SB	19.00%	22.38%	$965,958,888	19.46%	$1,004,205,756
SDB	8.00%	14.30%	$617,419,690	10.83%	$558,528,400
HUBZone	0.80%	1.32%	$56,792,545	2.27%	$116,962,428
WOSB	3.00%	7.58%	$326,991,338	5.29%	$272,896,495
SDVOSB	3.00%	5.64%	$243,248,889	4.86%	$250,652,840

RDECOM

CATEGORY	FY18 GOALS %	Actual % 25-Jul-17	FY17 SB Eligible $2,272,079,298	Actual % 25-Jul-18	FY18 SB Eligible $2,334,597,199
SB	35.00%	33.63%	$764,173,505	37.26%	$869,949,666
SDB	9.00%	10.32%	$234,512,496	12.13%	$283,284,582
HUBZone	1.00%	1.32%	$29,984,085	2.14%	$49,890,540
WOSB	5.00%	7.62%	$173,222,901	6.51%	$151,909,446
SDVOSB	4.20%	5.38%	$122,306,133	5.48%	$128,042,622

FY17 Top 10 NAICS Codes

NAICS	Category	Dollars
541330	ENGINEERING SERVICES	$1.8 B
541712	RESEARCH AND DEVELOPMENT IN THE PHYSICAL, ENGINEERING, AND LIFE SCIENCES (Except BIOTECHNOLOGY)	$1.7 B
334511	SEARCH, DETECTION, NAVIGATION, GUIDANCE, AERONAUTICAL, AND NAUTICAL SYSTEM AND INSTRUMENT MANUFACTURING	$1.2 B
334290	OTHER COMMUNICATIONS EQUIPMENT MANUFACTURING	$644.3 M
334220	RADIO AND TELEVISION BROADCASTING AND WIRELESS COMMUNICATIONS EQUIPMENT MANUFACTURING	$328.5 M
541511	CUSTOM COMPUTER PROGRAMMING SERVICES ALL OTHER MISCELLANEOUS ELECTRICAL EQUIPMENT AND COMPONENT MANUFACTURING	$291.4 M
335999	ALL OTHER MISCELLANEOUS ELECTRICAL EQUIPMENT AND COMPONENT MANUFACTURING	$287.0 M
333314	OPTICAL INSTRUMENT AND LENS MANUFACTURING	$268.1 M
811213	COMMUNICATION EQUIPMENT REPAIR AND MAINTENANCE	$227.2 M
334111	ELECTRONIC COMPUTER MANUFACTURING	$223.5 M

Contract Opportunities (1of6)

FBO #	Description Title	NAICS	Small Business POC
W25G1V-TBD	The contractor shall support the existing Government workforce by providing qualified on-site personnel to perform **Professional, Analytical, and Logistics Support Services (PALS)** in the Logistics Modernization Program (LMP)/Enterprise Central Component (ECC)/Complex Assembly Manufacturing Solution (CAMS) for TYAD.	**541614**	**David Kern**
W25G1V811300TH	This **construction project** consists of application of spray foam insulation to the roof underside and wall panels of Building 17, and install two (2) gas-fired power-exhausted heaters.	**236220**	**David Kern**
W25G1V-18-R-0042	This requirement is for the **design and construction** services associated with the renovation for seven restrooms and one laundry room to Building 230 at Tobyhanna Army Depot.	**236220**	**David Kern**
W25G1V812000U6	The contractor shall provide all plant, labor, materials, licenses, permits, equipment, supervision and management to complete the design and construction services associated with the Building 58 **Sprinkler Upgrade**.	**236220**	**David Kern**
W25G1V8120022I	This requirement is for the supply, delivery, assembly, installation and RF Testing of three (3) RF Shield Room(s) at Tobyhanna Army Depot in support of three programs: CHALS, CVRJ & DUKE.	**332311**	**David Kern**

Contract Opportunities (2of6)

FBO #	Description Title	NAICS	Small Business POC
W56KGU-18-R-T011	This requirement includes equipment inventory, shipping and receiving, logistical support, process monitoring, and facility upgrades. All services will be supported with the Continuous Process Improvement (CPI) concept and techniques to help process improvements within Intelligence and Information Warfare Directorate (I2WD). In addition, the contractor shall establish and maintain a Government approved inspection system to ensure that all deliverables (including data) submitted to the Government conform to contract requirements .	541690	James Branson
W56KGY-D-0005 0016	This requirement is for pre-priced, Firm-Fixed-Price Common **Sensor Payload Spare Parts**.	334511	James Branson
SSESNG-17-R-2072	Post Deployment Software Support (PDSS) and Post Production Software Support (PPSS) support requirements for the tactical communications systems listed in Appendix C (System Descriptions). This support includes project management, software engineering, system engineering, requirements management, information assurance, laboratory facility management, formal review requirements, required deliverables, incidental travel, equipment responsibilities and utilization.	541330	James Branson

Contract Opportunities (3of6)

FBO #	Description Title	Small Business POC
TBD	**Fielding Support Services**: Provide fielding, installation, training, logistical support, and Field Service Representation (FSR) support for the PM Mission Command portfolio of Command Post, Platform based and Fire Support and Control/Situational Awareness products.	Kelly Credle
TBD	**MC Product Support**: Provide product support for the development, delivering, publishing, and maintaining of data deliverables/products regarding the Command Post and Platform based Command, Control, and Situational Awareness systems covered under PM the Mission	Kelly Credle
TBD	**Logistics, Fielding and Training Services**: Program Manager Tactical Radios (PM TR) has a requirement for Integrated Logistics Support (ILS) that include logistics planning, technical writing, training, fielding, property book, warehouse management, shipping and assisting PM TR with the acquisition life cycle of all the programs.	Kelly Credle
TBD	**Next Generation Load Device-Medium (NGLD-M)**: The Army Key Management (KM) program will require manufacturing, production and service support for the Next Generation Load Device-Medium (NGLD-M) fill devices. The NGLD-M is envisioned to be an SKL v3.1 with a RESCUE cryptographic engine technology insertion. Support services requirements include technical assistance and periodic engineering change proposals.	Kelly Credle
TBD	**Mass Updaters**: Product Lead Communications Security (PdL COMSEC) requires a small hardware production run for Individual and Mass Updaters for various encryption devices. Developed by the Government, these Mass Updaters feature a simple user interface which eliminates the need to manually upgrade and test the encryptor's software.	Kelly Credle

Contract Opportunities (4of6)

FBO #	Description Title	NAICS	Small Business POC
W91CRB-18-	**Systems Engineering Technical Assistance (SETA)** to assist Army Futures Command (AFC) to design, document, implement and hand off an enterprise level Data Analytics Platform (DAP).	**541512**	**Stacey Gaddis**
W56JSR-R-18-0033	The Software Engineering Center (SEC) Enterprise Information System-Directorate (EISD) requires system support services for **the Army Food Management Information System (AFMIS)**. This support encompasses system analysis and technical logistical and life cycle support for the AFMIS system, including work associated with the software sustainment, customer support,	**541519**	**Stacey Gaddis**
W91CRB-18-D-0006	This procurement is a CPFF task order off a single award Indefinite Delivery Indefinite Quantity basic contract that provides data collection and analysis services for Army Materiel Systems Analysis Activity, W23SR3. The basic contract was recently competed and awarded to start in July 2018; the task will support collection efforts in Kuwait.	**518210**	**Stacey Gaddis**
W91CRB-18-R-5030	The Communications-Electronics Command (CECOM)-Security Assistance Management Directorate (SAMD) has a requirement for **HF Transceiver Spare Parts**. Subject action is in support of the Government of Egypt and is being procured under FMS Case: EG-B-VBJ.	**334419**	**Stacey Gaddis**
W911SR-18-C-0034	**Dynatherm ACEM Thermal Desorption Systems** and related consumables. The Dynatherm product line has been used the US Army ECBC for more than 20 years for air monitoring of chemical agents for health and safety of personnel.	**541330**	**Stacey Gaddis**

Contract Opportunities (5of6)

FBO #	Description Title	NAICS	Small Business POC
W909MY18RA013	Responsive Strategic Sourcing for Services (RS3) task order titled "Night Vision and Electronic Sensors Directorate (NVESD) Security, Resource Management and Program Planning Support" (RS3-18-0052). The Contractor is required, in the form of personnel and materials, to provide the planning and management of resources and manpower, security support, agreement management and coordination, and event planning functions related to NVESD and NVESD Programs. NVESD requires a team with analytical, management and an overall understanding of technical requirements in order to support diverse rapid response laboratory management and field requirements.	**541715**	**Valerie Oliver**
W909MY18C0013	This is a Broad Agency Announcement (BAA) effort titled "3rd Generation Forward Looking Infrared Dewar Cooler Bench Integrated with a III-V Strained Layer Superlattice Focal Plane Array". This capability will provide reconnaissance, targeting, surveillance, and acquisition capabilities. In addition to the Abrams and Bradley platforms, there are other ground and air systems being considered for this insertion. The critical technology for this improvement is the infrared Focal Plane Array (FPA) that is being engineered for this upgrade.	**541715**	**Valerie Oliver**
TBD	Calibration of various test equipment found throughout Fort Huachuca, Electronic Proving Ground.	**811219**	**Valerie Oliver**

Contract Opportunities (6of6)

FBO #	Description Title	NAICS	Small Business POC
W9128Z-18-R-8011	Call Order is for the procurement of **400 Minute Voice Plan** (US, Canada and Guam) - Includes voice minute sharing, unlimited domestic Text/PIX/FLIX messages, unlimited domestic nights & weekends, unlimited domestic mobile to mobile calling and international voice roaming capability, Unlimited Domestic Data Plan (Mobile Broadband). Excessive data use is subject to data throughput limitations on a monthly basis, 400 Voice Minutes + Unlimited Domestic Data – Includes voice minute sharing, unlimited domestic nights & weekends, unlimited domestic mobile to mobile calling, unlimited domestic Text/PIX/FLIX, unlimited domestic data and international voice roaming capability.	**517312**	**Sonya DeLucia**
TBD	Underground Storage Tanks (USTs) Maintenance, Compliance Testing, And Inspection Services at various locations on Fort Huachuca for IMCOM, DPW, ENRD.	**237120**	**Sonya DeLucia**
TBD	Local exchange services for the Raven Rock Mountain Complex, MD.	**517311**	**Sonya DeLucia**

Doing Business with the Army

- Know the market and narrow your perspective
  - Federal Supply Codes (FSC) http://everyspec.com/FSC-CODE/
  - North American Industry Classification System (NAICS) https://www.census.gov/eos/www/naics/
- Register with the System for Award Management (SAM)
  - www.sam.gov
- Familiarize yourself with the Federal Acquisition Regulations (FAR)
  - FAR Part 19 Small Business Programs and other Parts http://farsite.hill.af.mil/
- Know representatives from the Small Business Administration and Procurement Technical Assistance Centers
  - https://www.sba.gov
  - http://www.aptac-us.org/
- Seek opportunities – Monitor the Federal Business Opportunities Website
  - https://www.fbo.gov
- Build relationships OSBP-APG and SB kiosk website
  - https://osbp.apg.army.mil

Doing Business with the Army

- **Research Customers**: research the activity you'd like to support; most Army activities maintain their own websites, and this information may be helpful in identifying the primary mission and sub-activities of the commands.
  - U.S. Army Materiel Command (AMC) www.army.mil/amc/about.html
  - Space & Missile Defense Command/Army Forces Strategic Command www.army.mil/smdc
  - U.S. Army Corps of Engineers (USACE) www.usace.army.mil
  - U.S. Army Intelligence & Security Command (INSCOM) www.army.mil/inscom
  - U.S. Army Medical Command (MEDCOM) www.army.mil/armymedicine
  - U.S. Army Training and Doctrine Command http://tradoc.army.mil/index.asp
  - U.S. Army Forces Command https://www.army.mil/forscom/
  - U.S. Army Medical Research & Materiel Command (MRMC) www.mrmc.amedd.army.mil
  - National Guard – www.nationalguard.mil
  - U.S. Army Program Executive Offices https://www.army.mil/asaalt#org-resources www.peostri.army.mil, www.eis.army.mil www.peosoldier.army.mil/, https://www.army.mil/PEOAviation, http://peoc3t.army.mil/c3t/, https://peoiews.army.mil/

Presenting Your Business Capabilities

OSBP-APG is your advocate and **first-line of access** to preparing for a meeting with the CECOM and C4ISR Mission Partners

- **Do your research prior to the meeting**
- **Arrive prepared to brief capabilities**
- **Ensure appropriate representative(s) are in attendance**
- **Focus discussions on capabilities that align with requiring activities mission**
- **Clearly articulate "why your company"**

Be prepared for constructive feedback, recommendations (homework), and possible follow-up discussions with OSBP prior to a scheduled meeting with an activity and/or individual.

OSBP-APG will assist you during the process…

OSBP-APG Trusted Professionals

Small Business Professional Contact List

Small Business Professional	Primary Customer(s)	ACC-APG Contracting Division and DoDAAC
James D. Branson james.d.branson.civ@mail.mil	CERDEC/MITRE/ PEO IEW&S	Div A - **W56KGU** Div C - **W56KGY**
Kelli N. Credle kelli.n.credle.civ@mail.mil	PEO C3T	Div B - **W15P7T**
Stacey P. Gaddis stacey.p.gaddis.civ@mail.mil	JPEO CBD/FMS/ PEOSEC/ILSC Soldier/CMA/ATEC/ECBC Garrison (DPW) Tenant	Div D - **W91CRB & W9125F** Div E - **W56JSR** Edgewood Div – **W911SR** Tenant Div - **W91ZLK**
Valerie B. Oliver valerie.b.oliver.civ@mail.mil	IEWS/CERDEC	Belvoir Div - **W909MY**
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David K. Kern david.k.kern.civ@mail.mil	TYAD	TYAD Div - **W25G1V**
David O. Christ david.o.christ.civ@mail.mil	RDECOM, ARL, ARO, STTC, & USAITC	Research Triangle Park (RTP) Div - **W911NF & W911QX**
Anne M. Carman anne.m.carman.civ@mail.mil	ARL/IMCOM	Adelphi Div - **W911NF & W911QX**
Christopher V. Sao christopher.v.sao.civ@mail.mil	PEO Soldier/JPEO CBD, NRC, NAVFAC	Natick Div - **W911QY**

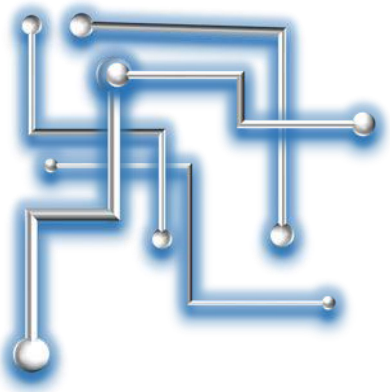
2018 Outreach Events

Industry Outreach Opportunities

- **Aug 14–16 DoD BPII/MPTW - Orlando, FL**
- **Aug 20-24 TechNet Augusta - Augusta, GA**
- **Oct 8-10 2018 AUSA Annual Meeting - Washington, DC**
- Oct. 10 TRIAD - Chantilly, VA
- Oct. 11–12 National HUBZone Conference - Chantilly, VA
- **Oct 23–25 SBIR/STTR Innovation Summit - Tampa, FL**
- Oct 31–Nov. 2 NVSBE - New Orleans, LA
- Oct 31–Nov. 2 SAME Federal Small Business Conference - New Orleans, LA
- **Nov date TBD. Industry Networking Event, Aberdeen, MD (OSBP-APG/Maryland PTAC)**
- Nov 12–14 APTAC Fall Conference - Washington, DC

~Thank You for Your Time~

Office of Small Business Programs
OSBP-APG



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Outreach Email: usarmy.apg.cecom.mbx.small-business-outreach@mail.mil

Register and share capabilities on the OSBP-APG SB Kiosk:
https://osbp.apg.army.mil/Home/SmallBusinessCompany